25 CENTS

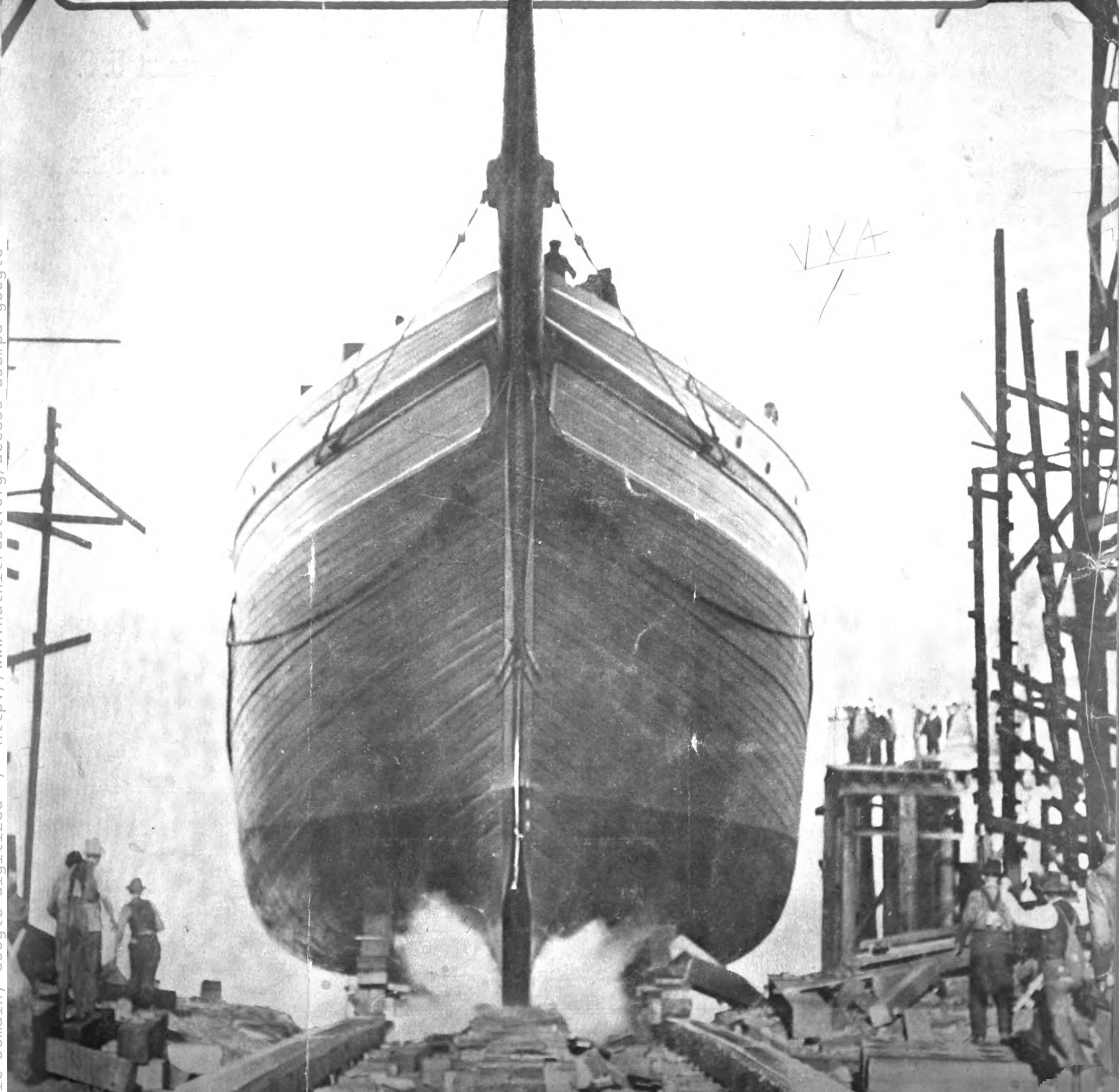
MOTORSHIP

(Trade Mark Registered U. S. Patent Office.)
Contents Copyright, 1918, by Miller Freeman.

Devoted to Commercial and Naval Motor Vessels

March, 1918

Vol. 3 SEATTLE NEW YORK No. 3



Generated on 2024-09-13 08:59 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
NEW YORK PUBLIC LIBRARY

Published on the Twenty-fifth of the Month

MOTORSHIP

United States and Mexico, Per Year $3.00
Foreign Countries $3.50
Per Copy 25c

Contents copyrighted 1917, by Miller Freeman

Vol. 3 SEATTLE, U. S. A., MARCH, 1918 No. 3

Government Action Urgently Needed

NEVER before was there a time when government action was more urgently needed to hasten motorship and oil-engine construction, and we feel assured that all who read the revelations made in this issue of "Motorship" will arrive at similar conclusions. Indications tend to show that some of the officials at Washington responsible for the construction of merchant ships, up to now, have not regarded motor-vessels as of sufficient importance to consider them a serious emergency war measure; also that they may have been misled to an extent as to the real importance and practicability of the marine oil-engine by the apparent ignorance on this subject of their late consulting-engineer and naval-architect. We do not use the word "ignorance" in a general sense, but as an indication that their late advisor is not an expert on, and is not properly acquainted with, the motorship and oil-engine question, as revealed by his own evidence before the Senate investigation committee.

It is the opinion of Motorship that the views expressed by Mr. Ferris regarding motorships and the marine crude oil internal-combustion engine to the U. S. Senate Investigation Committee, on January 3, are misleading, if not prejudiced.

Of course, every man is entitled to his own opinion; but, because of the very important advisory position held by Mr. Ferris at that time with the Emergency Fleet Corporation, we are afraid that a very harmful impression has been created, not only among members of the Senate Committee, but among the principal officials of the Shipping Board.

Since he gave the evidence of which we reproduce extracts, Mr. Ferris was asked to resign his position because of accepting a large commission from a bunker-coal concern, for whom he previously carried out a considerable amount of professional work. His condemnation of the domestic-built economical crude-oil engine doubtless has nothing to do with his business associations with the coal concern; but we do hold that Mr. Ferris' experiences with Diesel-driven ships are not sufficient to justify his giving expert advice on the subject to the Shipping Board, and to have "turned down" oil-engine builders who have offered to "do their bit" to assist in the great ship construction program.

Mr. Ferris' Testimony.

The following are extracts from Mr. Ferris' statements:

Mr. Ferris: I came to this general conclusion, that for a barge intended for inland service or for moderate coast work where the sea would not be too rough, the concrete vessel would probably be successful; but for a self-propelled vessel for ocean service, I did not want to have anything to do with it. * * *

Senator Nelson: Is it not a fact that, where they started these concrete vessels in Denmark and in Norway, they are a small type of vessel?

Mr. Ferris: Very small.

Senator Nelson: And they use the Diesel motor, do they not?

Mr. Ferris: Yes, sir.

Senator Nelson: Yes, instead of having a steam engine, they use what they call the Diesel motor.

Mr. Ferris: They use the Diesel motor, which is an internal combustion engine.

Senator Nelson: And the first ship constructed of concrete was in Denmark, and then they made one or two of these ships in Norway?

* * *

Senator Nelson: I saw a man who is interested in the building of one of those ships in Norway, and he came over here looking for a Government job, and he showed me his plan.

Senator Bankhead: Would you not say, Mr. Ferris, that a concrete ship would be too rigid—too stiff?

Mr. Ferris: Yes; I believe that the vibration of the machinery is going to work havoc with that kind of construction; it is going to crack.

Senator Johnson: That is, the vibration will destroy it?

Mr. Ferris: Yes, sir.

Senator Johnson: But the concrete construction has made very great advance recently, has it not?

Mr. Ferris: Yes, sir.

* * *

Senator Nelson: I suppose that is why they have the Diesel engine in those concrete ships, to avoid that vibration that you speak of?

Mr. Ferris: Yes!

* * *

Mr. Ferris: I look upon the proposition in this way, that it is an untried thing. To illustrate, when the wooden-ship question came to the front everybody seemed to have the idea that the wooden ship had to have the internal-combustion-engine. Well, I took this position, that no American manufacturer had built an internal-combustion-engine, put it in a ship, and made an over-sea demonstration of it.

I remember, when the matter came up, that Gen. Goethels asked me if I was going to pass it. I said, "Only conditionally; that this man will make guaranty of these engines, and if you are willing to accept the ships under this guaranty and make it conditional, I will pass it." He said, "No conditions." I said, "Nothing doing; I will not accept any internal-combustion engines for over-sea work, because they have never been demonstrated."

Now, you can picture the conditions we would have to-day if we had internal-combustion-engines in the majority of these wooden ships. You could not get the personnel to run them; in the first place, there would be trouble to build the ships, and then you could not operate them after they were built.

Senator Nelson: They are more ticklish work than running an automobile.

Mr. Ferris: Yes; we would have an awful time running them.

Senator Johnson: Well, when we had the first eight-cylinder engines for automobiles there was a good deal of objection to them; some people said they would rather stick to a Ford car. First, we had the six-cylinder, and then the twin six, and so on, and finally they came to the eight-cylinder engine.

* * *

Mr. Ferris: My work with the Clinchfield Navigation Co. had been—they were coal operators; they built ships to contract; they were contractors of ships. I planned and supervised their ships. As far as any relations they had with the Sloan Ship Building Co. are concerned, I had no knowledge of that.

Senator Jones: And they are ship brokers, too?

Mr. Ferris: You may term them "ship brokers" now. They built ships to handle coal that they had to transport. The Clinchfield Navigation Co. is the subsidiary company of Blair & Co., who own large coal fields. In other words, the Clinchfield Navigation Co. and the Clinchfield Coal Co. operate together, and they built those ships for carrying coal; and then the prices of ships went up, and the market for ships became so great that they sold the ships. But I had never regarded them as ship brokers.

Senator Jones: Well, you understand, did you not, that if they got a contract with the Emergency Fleet Corporation for the building of 12 ships they would have them built through the Sloan Corporation?

Mr. Ferris: I assumed that, yes.

Senator Jones: Did you have anything to do with their turning these four Ferris type motorships over to the Emergency Fleet Corporation?

Mr. Ferris: Motorships?

Senator Jones. Yes.

Mr. Ferris: The motorships are not owned by the Emergency Fleet Corporation as far as I know.

* * *

Mr. Ferris: I laid down, first, four motorships for the Clinchfield Navigation Co. for the Sloan Corporation, and then I laid down plans for steamers; and when I heard or understood that they had a contract for four steamers I changed the plans of the steamers to what would be termed the Ferris type in order to get a standardization.

Senator Nelson: What is the difference between a motorship and a steamship?

Mr. Ferris: A motorship is propelled by an internal-combustion-engine—which I would not recommend for the Fleet Corporation.

Senator Nelson: And these four motorships were of that type?

Mr. Ferris: Yes, sir.

* * *

The Chairman: You knew, Mr. Ferris, that the Clinchfield Co. did not have any shipyards, and did not propose to have any shipyards?

Mr. Ferris: If you will permit me I should like to say that I have not any interest in any shipyard, ship-operating company, or with any brokers, or in any patent devices, or in any royalties. I have never introduced in my business a brokerage branch. I try to carry my business on in a manner strictly professional, working for my clients and doing the best I can for them, and having no interest aside from that.

Senator Jones: That was not what I asked you, Mr. Ferris. I just said that you did know at the time that they had no shipbuilding plant or yard and were not building ships. You knew that, did you not?

Mr. Ferris: Yes; I did.

Inconsistency of Statements Shown.

Mr. Ferris, it will be noticed, stated that Diesel engines are being used abroad for concrete ships, instead of steam machinery, in order to avoid vibration. Yet not long ago he was reported by the N. Y. "Evening Mail" (see page 8, Motorship, for October, 1917) to have said—"Many of the emergency ships were of wood and it was necessary to keep the vibration down to a minimum, and that there is far more vibration from an internal-combustion engine than from one driven by steam." Apparently his own beliefs are contradictory, unless he has changed his views regarding the vibration of oil-engines.

Mr. Ferris said that he "would not accept any internal-combustion-engines for over-sea work because they have never been demonstrated." All readers of this journal will realize that this statement is so obviously inaccurate that there is no real need to deny the same. Quite a number of American heavy-oil engined ships have made trans-Atlantic and trans-Pacific voyages—including wooden vessels, also hundreds of trans-ocean voyages have been made by foreign motorships.

Possibly Mr. Ferris has forgotten the successful voyages made to England and to the Mediterramean about a year ago by ten American-built Diesel-engined submarines under their own power. What a high-speed, light-weight, oil-engine will do can easily be accomplished by a heavily-built, slow-speed oil-engine.

As regards the operation of motorships, we absolutely cannot agree with Mr. Ferris that the Emergency Fleet Corporation would have an "awful time running them" and that they could not operate them after they were built.

Let Mr. Ferris remember that the real necessity, or cause, for building these cargo ships—namely the German submarines,—all are Diesel driven,—yet they seem to be efficiently operated. Also we never have heard of any difficulty in securing capable engineers to run the Diesel engines of American submarines. We do not believe any difficulty would result, provided the men were sent to the engine-works during the final stages of construction, which would give them the necessary experience. In his reply to Mr. Ferris, Senator Johnson had the right idea at the back of his

Generated on 2024-09-13 09:07 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

mind, and no doubt could have better expressed what he meant had he been a technical man.

Need of Motorships Imperative.

We are inclined to think that the U. S. Shipping Board and Emergency Fleet Corporation are so overwhelmed with work, and have been confronted with so much trouble, that they virtually desire to avoid further worries in the way of construction and operation of something that is almost entirely new to them. While we fully sympathize with them over the difficulties with which they are confronted, this is wartime, and war allows of no sentiment. As we previously have intimated, without the economical and efficient Diesel engine, Germany's case would have been absolutely hopeless months ago, and America must utilize the same machinery to evade and destroy the Diesel-driven submarines.

Ships! Ships! and Ships! is the continuous cry sent out by all the allies. Why? Because they are needed to replace those daily destroyed by the efficient Diesel-driven submarine. We must build ships that do not reveal their presence miles away by columns of smoke high in the air, and we must build ships that will carry the maximum amount of cargo for a given power and overall size. Because well-operated motorships are absolutely smokeless, and as motorships of 10,000 tons displacement will carry about 1,000 tons more cargo on one-third the amount of fuel than wi'l a steamer of 10,000 tons displacement, and as motorships do not place any strain upon the coal and mining labor supply of our a'lies, the logical l ne of construction for America to immediately follow is obvious.

If the 19 oil-burning cargo **steamships** of one well-known American shipowning company happened to be **motorvessels** they would carry at least 20,000 additional tons of cargo to Europe every voyage. Does not this mean anything?

Also, every sailing-ship, including the 400,000 tons of French steel vessels soon to be transferred to the United States, should be at once equipped with auxiliary oil-engine power. This. "Motorship" has been urging for months, and latest advices from the chairman of the Shipping Board state that the latter matter now is having the consideration of the Emergency Fleet Corporation. But why the delay?

Further, every steamship, sailing-vessel, and motorship sailing to the war zone should be equipped with an emergency motor-driven electric-lighting set and storage battery installed on deck for providing lights to launch the boats if the ship is torpedoed at night.

All these things need government action because the hands of private ship-owners practically are tied.

Only Hope Is in Motorship.

Some little time ago Mr. John A. Donald, one of the three commissioners of the U. S. Shipping Board, told the Senate Investigation Committee that he had written to all his friends on the Pacific Coast advising them that their only hope lay in the construction of big Diesel-driven **motorships.** Otherwise it would be impossib'e for them to compete against Japanese **steamships.** When Mr. Donald said that, he did not know that the Japanese government intended bui'ding economical **motorships**, too, which makes such construction by America all the more important. We reproduce the following letter from Mr. Donald which in this light may be interesting. It is as follows:

Washington, D. C., Feb. 2, 1918.

Editor Motorship:

Dear Sir—I beg to acknowledge receipt of your letter of January 31st. enclosing sketch of the steamship "Alaskan" taken from your publication which shows the difference in her internal arrangements as a coal burning steamer and as an oil driven motorship.

Without going into particulars of the matter, I have not the slightest doubt that the figures you mention are approximately correct and the saving in both weight and space is enormous and is sufficient in dull times to pay a dividend as against the coal burning ship.

However the main feature as it presents itse'f to me is in the selection of the type of Diesel engine. Those ships which have been constructed by Messrs. Burmeister and Wain of Copenhagen have been the most successful, and it appears to me that the efforts both of the Shipping Board and of private builders or individuals in this country should be directed toward securing the patent rights for the construction of these engines in this country; together with the service of a number of experts trained in their construction in order to insure absolute success.

But for the interruption of business created by the war, I believe that this type of engine would have been developed and applied both in European countries and in this country with a high degree of perfection which would have made it safe for capital to embark in the construction of engines of this type.

I do not know if you are aware of this but at the outbreak of the war in 1914 very large works for the construction of Diesel engines were in process of erection on the banks of the Clyde. That concern was supported by very powerful oil interests in Great Brita'n as well as by prominent bankers. I understand that the Rothschi'ds were backing this enterprise. The cost of these works was said to be about $4,000,000.

It now appears to me that if the United States is to come to the front as a shipbuilding nation, the sooner the construction of these engines on a large scale is commenced in this country the better. I am afraid, however, that at this late hour so far as the Emergency Fleet Corporation power plants are concerned its experts will feel that this type of engine cannot be adopted without considerable delay in engine production and to that extent therefore it could hardly figure in the adoption of power plants for the emergency construction.

I observe with interest your statement that the Japanese are already in the field providing for the construction of Diesel engines in Japan, of which fact I was not previously aware. The oil supply, however, is in this country and not in Japan, and it seems to me that the question of Government ownership of oil lands for supplying the needs of our navy and merchant marine at reasonable costs should receive serious consideration at once in order that the United States may take advantage of its economic advantages in this regard.

You have my permission to publish this letter should you so desire.

Yours very tru'y,
JOHN A. DONALD,
Commissioner U. S. Shipping Board.

Note that Mr. Donald states that "the sooner the construction of marine Diesel engines on a large scale is commenced in America the better."

Conditions Demand Economy of Space.

William Denman, former chairman of the U. S. Shipping Board, who has studied the motorship question very carefully, evidently has come to the same conclusion as ourselves, for, after testimony had been developed before the Senate committee showing the great advantages and successes of foreign motorships, he said: "It may be that before the war is over, if it hangs on as long as it seems, that the Diesel type of engine will have direct war service in giving the increased tonnage for the same number of ships."

The following is a verbatim extract from Capt. Pillsbury's testimony before the Senate committee, leading up to Mr. Denman's statement of the situation as quoted above:

The Chairman: Are these Diesel engines being used in overseas trade very much?

Mr. Pillsbury: Yes, sir; the Danes have for the last four or five years operated Diesel engines on ships up to 10,000 tons dead-weight very successfully.

The Chairman: For long voyages?

Mr. Pillsbury: For long voyages, and the Norwegians latterly—the Shipping Board, through me, in December or November, chartered the "George Washington," which was lying in San Francisco Harbor, a vessel of 9,400 tons dead-weight capacity. That vessel consumes only 10 tons of fuel oil every 24 hours and makes nearly 11 knots speed. If she were a coal burner she would burn 40 or 50 tons of coal.

Senator Ransde'l. How much oil would she burn as an oil burner?

Mr. Pil'sbury. If an oil-burner she would burn about 200 barrels and that would be about 30 tons of oil.

Senator Ransdell. That is an immense saving in fuel, then?

Mr. Pillsbury. And that is why I recommend that if the concrete ships are to be built that at the same time an American Diesel engine should be built which would make the consumption of fuel on those vesse's only about 7 tons per day instead of 35 tons of coal.

Senator Johnson. How much of a sailing radius has the "George Washington?"

Mr. Pillsbury. About 30,000 miles in her double bottoms, leaving all holds free for cargo.

Senator Nelson. They have several ships, have they not, both in Norway and Denmark, that they use these engines in.

Mr. Pillsbury. I think there must be close to 20 ships; so that it is no longer an experiment.

Senator Nelson. So far as those motors are concerned?

Mr. Pil.sbury. No, sir.

Senator Ransdell. Is there any reason you know of, why Diesel engines should not be operated over 10,000 tons? You say they have worked it up to 10,000.

Mr. Pillsbury. I think not. I had quite a long talk with the chief engineer and the captain while they were in the harbor, and they thought there was no limit. These were twin-screw ships, and each engine developed 1,700 horsepower.

Senator Johnson. Is there a great saving of space by reason of using the Diesel engines?

Mr. Pillsbury. It saves space because there is no boiler, and I suppose they must save 25 feet in the length of the vessel.

Senator Ransdell. It must save a great deal in the weight does it not?

Mr. Pillsbury. It saves the weight of the boilers and the weight of the water that the boilers use.

The Chairman. Does the "George Washington" operate on the coast?

Mr. Pillsbury. She is on a voyage from San Francisco to Manila.

Mr. Denman. May I put a question to the witness about the Diesel engine?

The Chairman. Yes.

Mr. Denman. I have been told by the people interested in the "George Washington"—I represented those people for some time out there.

Mr. Pillsbury. Yes, sir.

Mr. Denman. That there is a saving in space of equivalent to 3,000 tons in cargo, using ordinary fuel for runs between ports, due to lessening of fuel carriage and increased space within the vessel itse'f—I am not speaking of dead-weight; I am speaking of space.

Mr. Pillsbury. By reason of not having boilers.

Mr. Denman. Yes. What would you say as to the possibility of that?

Mr. Pillsbury. I think that would depend, Mr. Denman, somewhat upon the length of the voyage.

Mr. Denman. They were figuring on taking the supply of fuel for that round-the-world voyage, which, of course, would be smaller than filling all the water compartments with ballast and oil. Of course, the increase in dead-weight is not so great that the increase in space measurement would bring the vessel up to 12,000 or 13,000 capacity.

Mr. Pillsbury. I think that perhaps may be so—the saving is very considerable in the operation of a Diesel engine ship.

Mr. Denman. The relevancy, gentlemen, is this: The cargoes are very often much lighter than the actual carrying capacity of the ship, and your ship will be filled up with lightwe'ght cargo of great value to the commerce without having your increased dead-weight. Anything that adds to the space on the vessel is of enormous economic value in the carrying capacity of the ship, and where, as in this war, we are seeking space as well as dead-weight, it may be that before the war is over if it hangs on as long as it seems, that the Diesel type of engine will have direct war service in giving the increased tonnage for the same number of ships.

The Chairman. Would it take special trained men, very expert men, to operate the Diesel engine?

Mr. Pillsbury. It would not. I would think an intelligent engineer could go into the shops while those engines were being constructed and then see them installed in the ship, and then I think he would be competent to operate them.

The Chairman. I have been told that that was one difficulty—that it required very expert engineers to operate those engines, and that it was difficult to get the men to do it.

Mr. Pillsbury. The Danes have the practice of taking their chief engineer and first-assistant engineer, who have been on steamers, and sending them to the erecting or construction shops for a period of about three months before the engine was ready to go into the ships, and then they go on the ships in their respective capacities. That is the experience they have where previously the engineers have been on steamers.

Experimental Stage Past.

Edward N. Hurley, Chairman of the Shipping Board, certainly has achieved some magnificent work in connection with the ship-building program, and is one of the hardest-worked men in the country today. So it would not be surprising if he has not had time to personally investigate the motorship question as deeply as we would like him; for he says: **"In view of the fact that the shipbuilding program under the Fleet Corporation is an emergency program it is not regarded advisable to undertake the extensive experimental work that would be entailed in developing the in-**

(Continued on Page 28.)

Generated on 2024-09-13 08:57 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
NEW YORK PUBLIC LIBRARY

Engine Room Auxiliaries

Intereresting Examples of Diesel-Electric Machinery Used Aboard Merchant and Naval Vessels

THREE systems of power can be used for driving the engine-room auxiliary machinery of merchant and naval motorships, namely, electricity, steam, and compressed-air; but, except under special circumstances the latter can be eliminated as being more uneconomical than the others, although it has been used with reasonable success from an engineering point of view. Possibly, too, air has not been developed to the extent that it might have been, because of the amount of power absorbed when it has been used, and which has prevented it being looked upon with general favor.

engine-room is liable soon to get into a disgusting state and gives the visitor a poor and wrong impression of the main Diesel machinery. This the writer knows from experience. Exhaust fired boilers must have a larger furnace surface area than usual, and must be arranged for oil-firing when the ship is in port and the main engines standing cold.

However, the use of steam for the engine-room auxiliaries means that the steam also must be supplied to the steering-gear, deck-winches, syren, anchor-capstan, etc., and that the necessary steam piping must be laid on deck and over the engine-hours' tuition and even attend to minor repairs and adjustments. The same will be the case with marine engineers and motorships. It is merely a case of getting accustomed to its differences from steam.

The motorship is such a pronounced economy that it must come. Nothing can stop it! And all obstacles will be removed as fast as they arise. The law of nature will see to that. Very strong prejudices stood in the way of steam. But, one after another they were swept aside and it reigned triumphant for a century. Steam now has had its

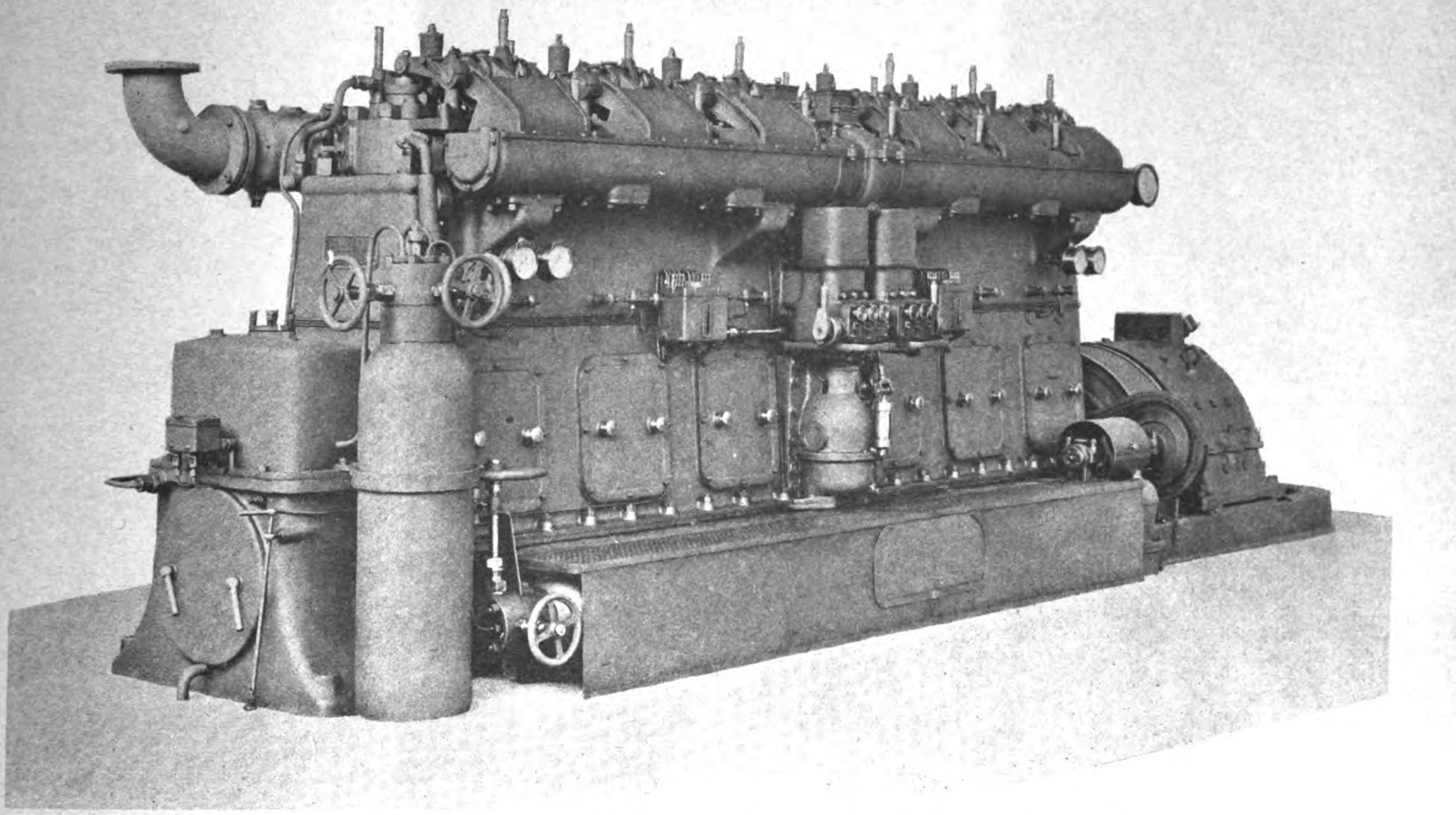


FIG. 1. THE TOSI-DIESEL DRIVEN ELECTRIC LIGHTING SET INSTALLED ABOARD ROYAL ITALIAN WARSHIPS SUITABLE FOR GENERATING SETS IN THE ENGINE ROOMS OF WARSHIPS

While it is conceded by the majority of motorship designers and owners that electrical machinery, even if more expensive, is the most all-round satisfactory system for driving the engine-room auxiliaries of motorships, there is no gainsaying that steam-driven auxiliaries have certain claims that cannot be overlooked, particularly in ships of high power where there usually is a sufficient volume of hot exhaust-gases from the main Diesel engines to generate all the steam needed when at sea; and, despite belief to the contrary there have been many actual instances where it has been used continuously with success, and which have come under the writer's personal observation on various occasions.

But, when the main motors are not over 1,500 b. h. p. aggregate, there can be no doubt but that oil-engine-electric driven is the most economical and best auxiliary system. If an oil or a coal-fired donkey-boiler be installed for steam auxiliaries its consumption of fuel is likely to nearly equal that of the main Diesel propel ing engine, and so largely counteracts the remarkable economy of the propelling plant, and the necessary boiler fuel will occupy otherwise valuable cargo space. Typical instances of this may be seen in the American motorships "Bramell-Point," "Holden Evans," "Ada," etc., where the donkey-boilers use over two tons of oil fuel daily.

When the waste exhaust gases cannot be utilized there can be no doubt of the electrical system being the more economical for all sizes of ships; but, when steam can be maintained at 90-120 lbs. pressure solely with the waste exhaust-gases, an additional economy can be effected, which cannot be derived from Diesel-electric, compressed-air, or from oil, and coal-fired steam. In all cases where steam is used for this purpose, the boiler and auxiliaries should be arranged in a compartment separate from the engine-room proper, otherwise the room, entailing higher first constructional costs, which about evens up the higher price of Diesel-electric auxiliaries. With electrically-driven machinery the deck-wiring is a comparatively simple matter, and the operation of deck machinery is not affected by extremely cold weather. In the case of a steamship that is to be converted to motor-power, it generally is better to let the steam auxiliaries remain, because of the piping already being in place, unless the donkey-boiler be worn out and needs replacing.

Under present-day conditions exhaust-heated auxiliaries for high-powered ships have other advantages, which in themselves are by no means non-important. Every new motorship means the training of at least a few marine steam-engineers to the operation of oil-engines; and if these ships have steam auxiliaries the engineers have not so much to learn at the outset, and, being accustomed to the running of steam auxiliaries, can devote all their time to familiarizing themselves with the handling of the main Diesel-engines, thus insuring better operation than if they had to devote one-third of their time to studying the heavy-oil-electric auxiliaries.

The time will soon come, however, when all marine engineers will be perfectly accustomed to the operation of heavy-oil internal-combustion-engines, and then electrical auxiliaries will become standard practice as owners will prefer to overlook the extra economy of exhaust-fired donkey-boilers (which is a saving of about 10 barrels of oil a day in the case of a 10,000 ton ship) in order to obtain the conveniences of electrical equipment.

We all remember how fifteen years ago, everybody thought that only a trained mechanic could run an automobile. Yet, today, despite the added complications of electric-starters, electric-lighting, and elaborate lubricating systems, anyone without knowledge of mechanics can drive after a few day. Its zenith has past, and gradually but surely it is being superseded by the more economical internal-combustion-power and by electricity. The latter two powers blend and work well together. Therefore, they will not be antagonistic elements. Closer co-operation between the electrical-engineer and the oil-engineer will be the outcome.

It is the natural law of economic development which has made the crude-oil internal-combustion engine important as propelling machinery of large vessels such as freighters, liners, submarines, tankers, whalers, exploration-ships, and warships, as well as of smaller work-boats such as ferries, fishing-boats, tugs, life-boats, patrol-craft, etc., and for the larger vessels the Diesel-type of engine has dominated.

This naturally has demanded a further development of the Diesel engine as driving medium for engine-room auxiliaries such as air-compressors; steering-gear; oil, water, fire, and bilge-pumps; electric-lighting sets, and electric-generating sets for furnishing power to the deck cargo-winches and anchor capstans. This development has proceeded to an extent where it is possible to entirely abolish steam-driven auxiliary machinery without any trepidation as to loss of reliability. And, in case of a donkey-boiler having to be used its size can be reduced to the minimum necessary for steam-heating and hot-water services. Even the two latter can be maintained by electrical apparatus or by exhaust heaters. In some cases the surface-ignition type of heavy-oil engine has been used for driving the compressors, generators, etc., but usually the Diesel engine builders have preferred to build small Diesel-type motors for the purpose.

The firm of Franco Tosi has given particular attention to small Diesel driven auxiliary machinery for the motorships and large submarines which they have built, and even have constructed

Generated on 2024-09-13 09:00 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

different designs for the different purposes which are required in the engine-rooms of such vessels. These engines range from a small three-cylinder 25 b. h. p. outfit to a large 450 b. h. p. electric-lighting and power generating set. All are of the four-cycle trunk-piston class, with box-frames of bronze or cast steel for the larger units, and bronze for the smaller sizes.

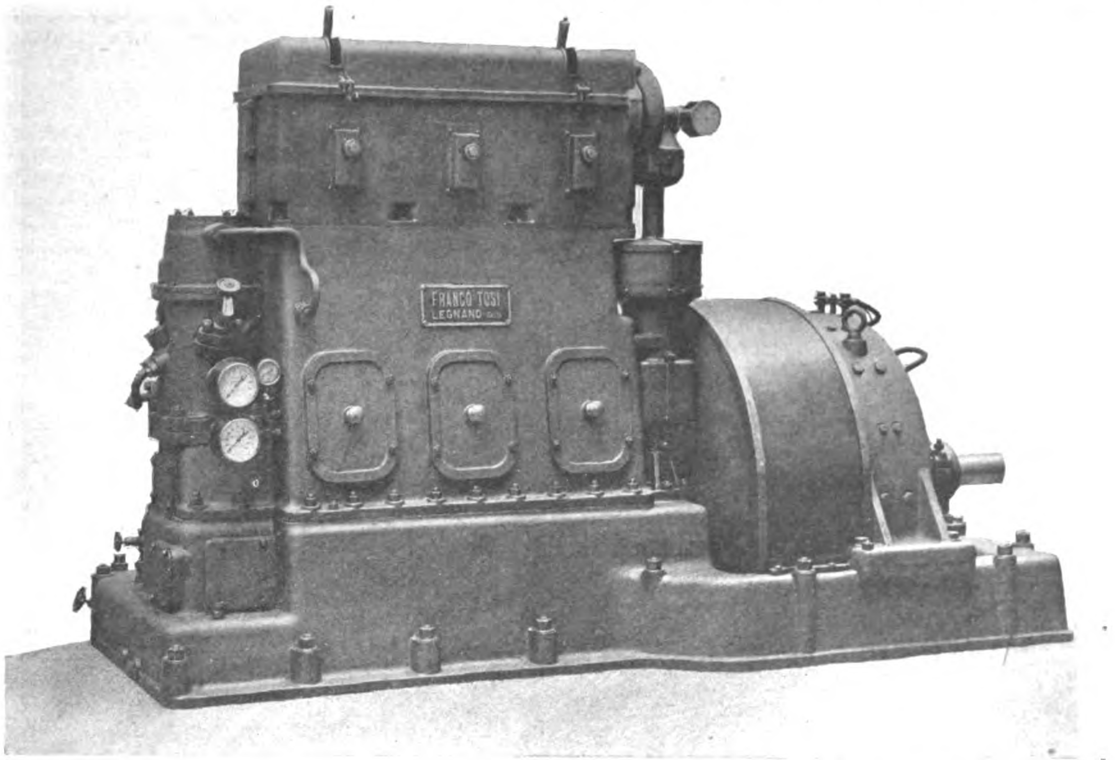


FIG. 2. THE FIRST EXAMPLE OF A TOTALLY ENCLOSED MARINE DIESEL ENGINE. THE TOSI-DIESEL MOTORSHIP'S ELECTRIC LIGHTING SET

In addition to their use aboard motorships, it is important to note that many sets have been built by them for electric-lighting on battleships of the Royal Italian Navy and have given most satisfactory results, consequently the Italian Admiralty have not hesitated to order Diesel engines of nearly four times the power for submarine propulsion, as well as large slow-speed Diesel engines for propelling tankships.

The type used on the Italian battleships is represented by Fig. 1, which is a 350 b. h. p. Diesel engine directly coupled to a 150 k. w. dynamo that generates current at 110 volts, the engine turning at 400 r. p. m. on the four-cycle principle. With this engine the frame is of cast steel. It will be noticed that the plant is complete with its own air-compressor, and starting and injection-air receiver, so is not dependent upon any other compressed-air supply. The compressor is a British-built Reavall, which in later engines will be replaced by one of Tosi's own design.

It must be admitted that this Diesel engine is of striking design and displays a desire for attractive appearance apart from the good engineering features incorporated, there being no doubt that European builders are willing to spend more time and money on imparting good finish to what many domestic engineers consider non-essential parts. While it may not add to the life of the engine, careful exterior design certainly assists the selling department and it generally indicates that the interior and essential parts are just as carefully constructed.

Each cylinder of this engine has its own fuel pump, the pump group being under the control of a centrifugal governor, which instantly cuts off the supply of fuel-oil to all cylinders at the same time, when the revolutions for any reason exceed the normal speed by 10%. Forced lubrication is fitted complete with filter, cooler, and circulating pump, the latter being driven off the crank-shaft. This gives the set assurance of steady service. As regards cooling of the engine it will be noted that the exhaust manifold, as well as the cylinders, are water-jacketed so that the radiation of heat does not augment the warmth of the engine-room even slightly. No special fuel-oil is used, this auxiliary engine using the same fuel as the main propelling engines. For cargo motorship work, where a high-powered generating set is desirable, this engine is well suited.

In Fig. 2 we have a 15 k. w. set, driven by a Tosi three-cylinder 50 b. h. p. Diesel engine, specially designed for use as lighting-plants on small motorvessels and sailing-vessels, or as emergency sets on the decks of steamers operating in the war-zone, which are subject to a German torpedo in their engine-room at night. In this event the deck-installation is ready for instantaneous starting, and ready to furnish a flood of light in order that the boats may properly be launched. All who have not forgotten the darkness of the "Titanic" horror will realize the necessity of such a set aboard every ship afloat. Many of the British, Dutch, and German transatlantic passenger vessels have such an installation. The larger the ship the more powerful is the equipment needed; but the set illustrated is quite large enough for freighters. This engine is completely enclosed, and has been shown to be a very convenient unit for the purpose.

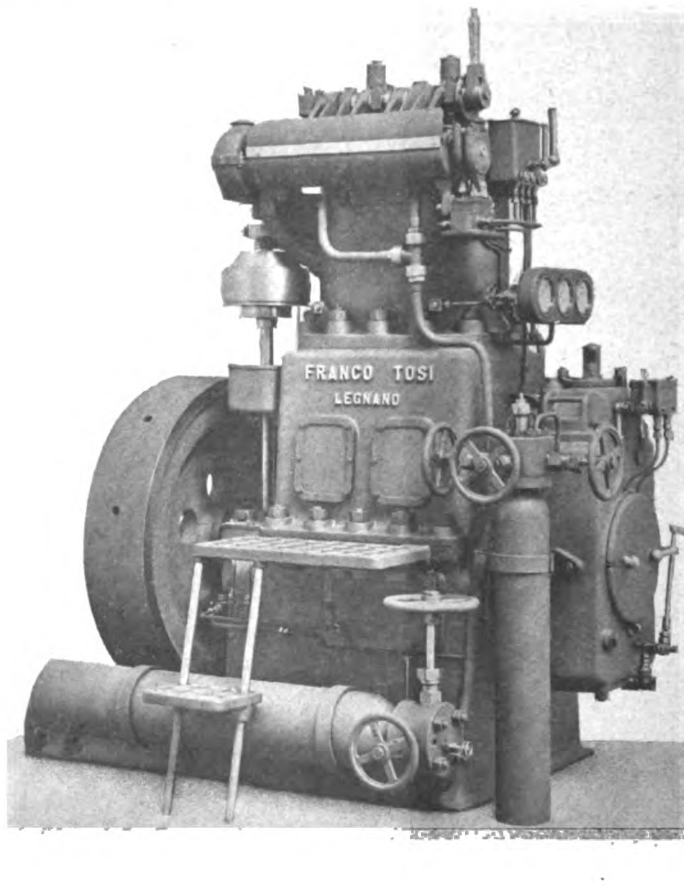


FIG. 3. A 25 B. H. P. TOSI-DIESEL AIR-COMPRESSING SET

Fig. 3 illustrates a combination air-compressing and electric-generating outfit, driven by a four-cylinder, four-cycle type Tosi-Diesel engine of 25 b. h. p., the entire set forming a compact group complete in itself with a common bed-plate. The compressor can be thrown out of operation by means of a friction clutch arranged between the dynamos and compressor. A set of this type is very useful for motorship engine rooms.

Belonging to the Royal Italian Navy are a number of Diesel-driven oil tankships of which three were built by Franco Tosi, and one of which was illustrated in Motorship of December, 1917, on page 34. Two auxiliary Diesel-engines are installed in each of these three naval motorships. They are used for driving the loading and discharging oil-cargo pumps, and each has a capacity of 250 tons (long) per hour.

The Diesel engine driving the pumps in each case is of 25 b. h. p., and has two working cylinders and is of the four-cycle type. It is entirely independent of the main engine, having its own air-compressor, air storage receivers, and starting devices. It is mounted, together with the pumps, on the one bed plate, and is connected with the pumps by means of a friction-clutch. Each cylinder has its own fuel-pump, and as in the case of the other engines, is under control of a centrifugal safety governor. But, in this case, excess speed is permitted up to 15% above the normal revolutions.

NORWEGIAN MOTORSHIP BUILDING PROFITS

It is announced that the directors of Akers Mekaniske Vaerksted Aktieselskabet, of Christiania, Norway (who are the constructional licensees for the Burmeister and Wain Diesel engine), have declared a dividend of 12 per cent.

ANOTHER BRITISH MOTORSHIP BUILDER.

According to the publicity announcements of Alexander Stephen & Sons, Glasgow, the Scottish shipbuilders, they build mail, passenger, and cargo ships of all sizes fitted with Diesel engines, turbines and reciprocating engines.

NEW FRENCH MOTORSHIP YARD.

At St. Malo, France, a new motorship building company has been formed to build wooden auxiliary sailing ships of from 500 to 3,000 tons d. w. c. These vessels will be driven by Diesel-type oil engines of sufficient power to give a speed of 8 to 10 knots so will be higher powered than the average American auxiliary. They will be built entirely of hard wood and will be classed "first-class for 16 years." Some very important personages are connected with the company which has a considerable paid-up capital. The head office is at 1 Place des Petits Péres, Paris.

Generated on 2024-09-13 09:02 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
NEW YORK PUBLIC LIBRARY

PUMPS FOR MOTORBOAT AND MOTORSHIP USE.

EVERY motor-driven craft, particularly large vessels, require a variety of pumps for various uses, such as fire-pumps, bilge-pumps, ballast-pumps, circulating-water pumps, fuel-feed pumps, general service-pumps, lubricator-pumps, and many others. So it may interest readers to know that the Lobee Pump and Machinery Co., of Buffalo, N. Y., manufacture a large range of rotary pumps of the eccentric-drum and gear types and will be glad to send an illustrated and descriptive book on their pumps to anyone mentioning "Motorship."

The Lobee patent eccentric-driven rotary pump consists of only three parts, namely, shell and heads, valves and piston. The shell and the foot of same is made in one solid piece, making the shell rigid, and prevents any strain being thrown on the piston or shaft, and the foot is secured with bolts to a substantial iron sub base. The heads of shell and the flanges of the suction and discharge openings are put on with through bolts and nuts, instead of tapped holes, thereby preventing stripping off the bolts in flanges of shell.

Four valves, the vital part of the pump, are formed in two pairs, one valve having two parallel arms provided with longitudinal ribs or tongues, and the other valve having two parallel arms provided with longitudinal depressions or grooves, forming slideways in which ribs or tongues upon the arms of the other valve seat and travel and pass back and forth through the slots in piston during operation and do the pumping. By this arrangement the valves are always kept in position to work, and are self-adjusting, requiring no cams to operate them whatever, and being positive in their action, are like two solid valves, which prevents lateral motion, back lashing, and from getting wedged in the slots in piston. Being so constructed they are automatically kept against the periphery of shell and create the vacuum.

The piston, which operates and carries the valves and through which they slide back and forth during their operation, is made solid, and not hollow, and is also made wide at both ends and prevents it from breaking in case any foreign substance gets into pump too large to pass the valves, and the shaft is made of steel. The steel shaft to which the power is applied is supported by two or three upright bearings instead of one, which prevent any uneven strain being thrown on pump and from wearing out the stuffing boxes and gland of same, which is not depended on for a bearing.

THE "PALAWAN" LAUNCHED.

An unusual launching took place at the Stone Shipyards in Oakland this month when the three-masted, schooner-rigged motorship "Palawan" was sent down the ways "all standing." The launching was entirely successful and the vessel will sail in a short time for Australia, where she will go in the South Sea trade. She was christened by Mrs. Henry Atkins, the wife of one of the owners of the vessel.

The "Palawan" is a 180-ft. schooner equipped with two 110 h. p. Union gas engines. A novel feature about her equipment is an improvised anchor chain winch which the Union Gas Engine Co. designed and installed at the last moment when it was discovered that the winch ordered of an eastern manufacturer would not be delivered for an indefinite time. The newly designed winch is a delicate piece of mechanism, and is geared up with the auxiliary engine. It is said to do its work very well.

The reversing gear of the engines is also somewhat out of the ordinary. As there was not room enough aft of the engines to put in the usual clutches behind the reverse gear a shaft coupling was put on each shaft and a brake installed. When under sail the shafts are uncoupled and the propellers turn without lessening the vessel's speed. When it is desired to use the engine the brakes are set and the propellers quickly stopped. The job of re-coupling them is then easily performed.

The auxiliary engine to run the pumps and lights is not needed when the main engines are running, as both the dynamo and pumps may be worked from an idle shaft, driven by a belt from one of the main engines.

DIESEL ENGINE USERS' ASSOCIATION.

There is in England an association performing very valuable work. This society is known as 'Diesel Engine Users' Association," and many interesting papers are read at meetings by its members. Full information concerning them may be obtained upon application to Mr. Percy Still, M. I. E. E., Honorary Secretary, 19 Cadogan Gardens, London, S. W. 3, England.

Burnoil Engine Development

AFTER developments and experiments covering a number of years, involving a very considerable amount of money, which we understand was well over a hundred thousand dollars including the initial plant, the Burnoil Engine Works, at South Bend, Ind., now have reached a fairly extensive production basis and already a large number of marine and stationary engines now are in service. Recently we had the opportunity of going through their works and at a later date, when further projected extensions have been made, we propose to say more about the plant.

Among Burnoil marine engines in service is one in the "Delphi," a towing and carrying boat owned by Mr. S. M. Daw, of Nellita, Wash., which, up to Dec. 1, 1917, had run over 7,000 miles, engaged in all kinds of towing. This little craft is 31 ft. long, 9 ft. beam, 5 ft. loaded draught and 4 ft. light draught, and the engine drives a 26-in. pitch by 24-in. dia. propeller. Sometimes the boat carries as much as six tons, and under ordinary conditions the speed is eight miles, this being better or worse according to the winds and tides.

One of the owners' sons, who did most of the running of the boat, says he can see no appreciable difference in speed running light or running loaded, and that a 70-mile trip is made in approximately the same time light or loaded. The engine, says Mr. Daw, performs just the same whether the boat is on its beam ends or laying over on its side in rough weather, or on an even keel in smooth water.

Once 60,000 feet of lumber was rafted and a disabled gasoline engined boat was picked up and towed with the lumber; but the engine turned up its regular number of revolutions for 14 continuous hours.

For fuel the engine is using asphaltum base fuel-oil of about 26 degrees Baumé, furnished by the Union Oil Co. of California. Occasionally the engine is started from cold on this oil but usually starts on kerosene, no blow torch or electrical device being used. This fuel costs the owner of the "Delphi" $2.10 per barrel of 42 gallons. Lubricating-oil consumption (Madison Kipp Lubricator) costs 23 cents per barrel. This makes the cost of operating the boat less than one cent per mile. Usually it is about $1.30 for a 150-mile round voyage.

The Burnoil engine, which is built under Hvid license, already has been fully described in "Motorship" and we shall have something more to say about it at a later date. It is, by the way, equipped with the Boyce Moto-Meter, such as has been used successfully on the radiator caps of automobiles and which lately has been adapted for installation on marine engines, showing that marine-engine builders are realizing more and more the importance of using heat indicators on their power plants. One of these little instruments placed in each outlet pipe, serves to indicate to the navigator the running temperature of his power plant.

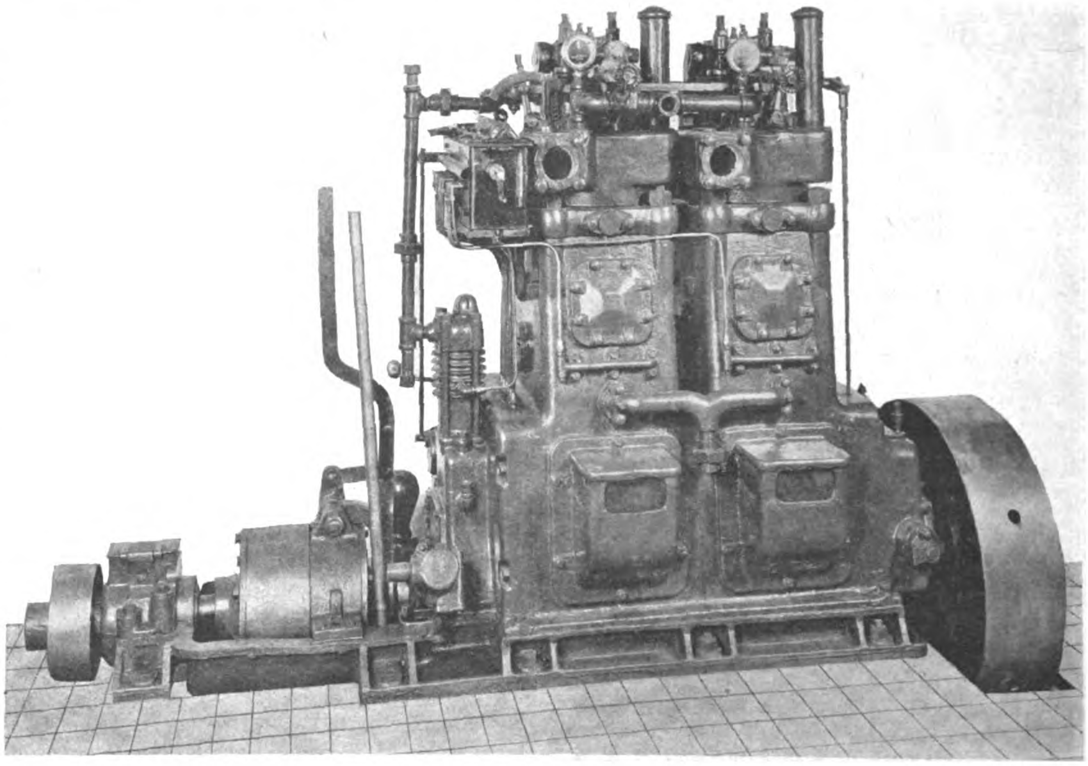
As in the case of the automobile, it enables the motor to be run at an efficient temperature, and serves as a never-failing indicator of trouble due to poor lubrication, or poor water-cooling circulation. A simple bi-pass or valve placed in the system at any point before the water enters the cylinders, enables adjustment of the water flowing through the cylinders, so that the owner can secure the maximum mileage per gallon of fuel. It has an added value as a repair-bill saver.

A typical installation is shown in the accompanying illustration of the Burnoil engine, where each cylinder carries a temperature indicator, it is possible to note the efficiency of each and thus balance the load on each by regulating the flow of cooling water.

THE "DELPHI"

The new distance-type instrument is designed to show to the navigator the temperature of his motor at any distance from the power plant. Thus, on large boats, the indicating dial can be placed under the navigator's eye regardless of the location of the helm.

The instrument is composed of a bulb which screws into the water outlet of the motor. From this bulb a fine copper tube runs to the indicating dial on the instrument board and is protected from damage by an outer flexible tube. The dial shows degrees of temperature and zones marked cold, cool, warm and hot. The instrument reads the temperature of the connecting tube and dial case, and is constructed to retain its accuracy under conditions of constant vibration. It is made by the Moto Meter Co. of Long Island City, New York.



TWO-CYLINDER BURNOIL ENGINE

Note the Moto-Motor on the Water Cooling Connections

Generated on 2024-09-13 09:04 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

MOTORSHIP

A journal devoted exclusively to Commercial Motor Vessels and their operation. Issued on the 25th of each month.
L. C. Smith Building, Seattle, Wash.

MILLER FREEMAN .... Publisher
RUSSELL PALMER .... Manager

Eastern Office, South Ferry Bldg., New York City.
San Francisco Office, 88 First Street.

United States and Mexico, per year........... $3.00
Canada and Foreign Countries in Postal Union... 3.50
Single Copies .... .25

All changes and new copy for advertisements must be furnished prior to the 5th of each month.

Entered as second-class matter at Seattle, U. S. A.

Notice of discontinuance of advertising must be given before the 1st of the month preceding issuance.

WHAT "MOTORSHIP" HAS DONE FOR AMERICA!

DURING the comparatively short time that "Motorship" has been published we consider it has accomplished more excellent and unusual work than any other marine publication, and we feel gratified that the results of our untiring labors are proving to be of the greatest value in assisting Uncle Sam and his Allies to win the war. In ordinary times we perhaps should be a little more reticent and modest; but, the present period is one of war, and we feel that our new readers should fully be acquainted with all that we have endeavored to do and with what we so far have accomplished. Let us turn back the pages for a year!

"Motorship" was the first to foresee and draw official attention to the great danger of the tankship shortage and to urge immediate construction of such vessels upon the U. S. Shipping Board. After several months the Emergency Fleet Corporation placed large orders for tankers; also the British Government decided to convert 35 new standardized and other cargo ships into tankers, although it delayed their delivery from three to four months.

"Motorship" was the first to urge upon the Shipping Board the importance of installing auxiliary oil-engine power in all existing sailing-ships, thus increasing their annual carrying capacity. After we had published several editorials on the subject and had taken up the matter direct with the Shipping Board, Mr. Thomas A. Edison placed a similar scheme before the officials at Washington. Our latest advices from Mr. Edward N. Hurley are that the Emergency Fleet Corporation have the matter of equipping existing sailing-ships with Diesel engines of moderate power now under consideration.

"Motorship" was the only journal to insist that every ship going through the war zone should be provided with an internal-combustion-engine-driven emergency electric-lighting set on deck, in order that our gallant sailors should have a chance to see to launch the boats when torpedoed at night and to render orderly the chaos that often exists when boats have to be launched in darkness. "Motorship" will continue with urging this until it is done. We have not forgotten the darkness of the "Titanic" horror which has been repeated in a smaller manner many times since the war.

"Motorship" was the only publication that had the courage (and perhaps the knowledge of conditions) to frankly point out the mistakes of using small motorcraft for submarine chasing in the Atlantic Ocean, and to indicate the real useful naval sphere of such boats. After construction of hundreds of 80-footers and 110-footers, both the British and American Navy Departments drew the same conclusions as ourselves and changed their plans accordingly.

"Motorship" was the only journal to urge the building of special submarine-destroyers of about 500 tons displacement. Recently the U. S. Navy Department contracted for a large number of vessels of this size and type, although they are to be steam-driven craft instead of Diesel powered, which latter feature we still firmly believe to be the better.

"Motorship" was the only journal to openly indicate the impossibility for the U. S. A. to attain mercantile marine supremacy until a large Diesel-driven motorship fleet is built, and to which end "Motorship" is continually working and urging upon the shipping authorities at Washington.

"Motorship" also first drew attention to the value of camouflaged motorships in evading submarines.

"Motorship" was the first to announce the intention of the Japanese Government to build a motorship fleet in order to attain mercantile supremacy on the Pacific Ocean.

"Motorship" has done more for commercial and naval internal-combustion-engines than any other publication, and has succeeded in converting many ship-owners from steam to oil engine power; also it has enabled ship-owners fully to realize that the large cargo motorship is a serious and successful business proposition with a wonderful future, and that it will not be long before steam is superseded on the high seas.

"Motorship" has published exclusive revelations of the remarkable developments made with naval and merchant oil engines abroad, and thus has kept domestic engineers, domestic shipbuilders, and domestic ship-owners in closer contact with foreign progress than otherwise would have been possible and the present issue contains several typical instances.

In addition to performing this valuable service, "Motorship" is engaged in the highly important work of tilling the soil and sowing the seeds for a great business harvest, which our supporters will reap after the war and possibly before that time. Many oil-engine builders' and ship-builders' present activities consist largely of governmental work, and they are almost unconsciously and slowly getting completely out of touch with the ordinary commercial markets, upon which they must depend as soon as the war has ended. At the present time "Motorship" is performing a function far beyond the capacity of any individual firm in the motor-shipping and allied businesses, so it is vital that everybody concerned shall give this clean-cut publication their wholehearted support, thus strengthen its arm and make its work even more effective.

A SUGGESTION TO SHIPOWNERS.

Possibly some disadvantages of motorships could be discovered by those who study the situation deeply enough (we know that many faults have been found by some who only have given brief thought to the subject) so we suggest to shipowners that they tabulate what they consider all the weaknesses of motor-driven vessels, and then compare them with the following advantages:

1—10% to 12% gain in cargo capacity.
2—Very large reduction in fuel bill.
3—Reduced constructional cost per ton of cargo carried.
4—Absence of stand-by charges in port.
5—Greatly increased radius.
6—Less frequent bunkering.
7—Elimination of unruly-firemen worries.
8—Reduced engine-room staff.
9—Revolutions of propellers are constant and not dependent upon moods of stokers.
10—Propellers never race in heavy weather.
11—Better propulsive efficiency when ship is in ballast.
12—Have about 40% special emergency reserve power over normal when chased by submarine, compared with about 10% to 15% with steam.
13—Smaller wage and food bills.
14—Always ready for instant charge.
15—Very rapid maneuvering—full ahead to full astern in 5 seconds.
16—Waste exhaust gases can be used for economically operating auxiliaries.
17—Dispensation of steam-piping on deck.
18—No telltale smoke to betray presence to enemy submarine.
19—Better all-year-round propulsion efficiency.

What will these advantages be worth to you in your shipping business when normal conditions are resumed? If you are not quite sure, a regular perusal of Motorship will demonstrate to you in a surprising manner what they have been worth to other shipowners.

"SUBMARINE CHASERS"—A BRITISH OPINION.

While there is not the slightest doubt that small motor craft are of very considerable value for the thousand and one odd jobs and services to which they are put by our navy and by our Allies, they are practically of no use for submarine chasing except under very special circumstances. About a year ago we received severe criticism for having taken this stand, and it is only comparatively recently that the U. S. Navy Department took the same view, and it will be recollected how Secretary Daniels told Congress that it was a misnomer to call the 110-footers "submarine chasers."

"The Graphic" (of England) for January 19, 1918, makes the following comments on small motor craft:

"A volunteer flotilla of patrol craft was formed in America consisting mainly of the motor and steam yachts of wealthy private citizens, who in many cases placed them at the disposal of the nation without fee or reward; and orders were at once placed for 350 submarine 'chasers.'

"It was rather curious that the United States should have dropped straight into this blunder—for blunder it was. Fairly early in the war ... of these craft, from 75 to 80 feet in length, had been ordered by the British Admiralty in the United States, with the idea that they should participate in the U-boat hunt; but their small size made them useless for sea-going purposes, besides rendering them unable to carry a gun capable of dealing with an up-to-date submarine; and as they are the most prolific gasoline-eaters they have never achieved a high level of popularity.

"The American naval authorities, naturally knew of their defects, and sought to avoid them by making their "chasers" 110 feet long. But this still left them far too small for the work intended for them, and after it had been reported in the technical U. S. papers that the first 110-foot boat to go on trial drew much more water than was expected, failed lamentably to reach its designed speed, and was not strong enough to stand the firing of the gun mounted on its forecastle deck, the 'chaser' was cut out of the program."

THE COVER FOR THIS ISSUE.

The very striking illustration used for the cover of this issue of Motorship is that of the motor auxiliary "Ethel," recently launched from the yards of the Columbia Engineering Company of Portland, Oregon, for M. T. Snyder of New Orleans. The "Ethel" is a sister ship to the "Tempate," being 172 feet on the water line, 36 feet beam, 16 feet 8 inches of moulded depth, with a gross tonnage of 700. Her engine equipment consists of two Wolverine engines of 200 b. h. p. each at 300 r. p. m., having a tankage capacity for 20,000 gallons.

The completion of the "Ethel" has been halted owing to the failure to receive engines which are to be installed by the owner upon arrival.

THE GREAT SAILING FLEET.

Under the above heading the "Philadelphia Record" draws attention to the large number of sailing ships now in service, and the following is an extract from the article in question:

"If there is sugar in Java, if there is wheat in Australia and Argentine—and there are all these things—the sailing vessels ought to be put to use on the Pacific and the South Atlantic. There are no steamers to spare. All that we can get hold of, whether our own or borrowed from Great Britain, are needed to carry troops and their supplies to France. But this great fleet of sailers that has been thrown out of business by the submarine is perfectly competent to bring wheat and sugar and nitrates from countries outside of the barred zone to American ports. Is it not possible to get the attention of the Shipping Board long enough to suggest this partial solution of the sea carrying problem? These sailers cannot carry so great cargoes or make so many trips as the better class of cargo steamers. But when we and our Allies are short of wheat and sugar it is high time that somebody took hold of the Shipping Board and forcibly turned its head in the direction of the large fleet of unemployed sailers."

We are pleased to say that after many months of agitation by Motorship the Shipping Board appears to be turning serious attention to the sailing ships, and Mr. Edward N. Hurley (chairman) advises us that the Emergency Fleet Corporation are considering the installation of Diesel engines of moderate power in existing sailing ships.

ATTENTION MR. HURLEY, PLEASE!

Recently a representative of Motorship visited at the plant of one of the largest and best equipped heavy-duty Diesel engine works in America, where a number of Diesel engines of 1,200 b. h. p. already have been completed. To his surprise he saw no fewer than 15 marine steam engines of 1400 i. h. p. under construction for the U. S. Emergency Fleet Corporation. It is our opinion that the official of the Fleet Corporation responsible for such a wicked waste of trained Diesel engine mechanics, and for the waste of a plant specially adapted for Diesel oil engine construction, should be severely censured. Yet, some officials of the Fleet Corporation claim that marine oil engines cannot be obtained! We draw this to the attention of Chairman Edward N. Hurley. We do not doubt for one moment that the engineering works in question would prefer to build the steam engines, as no additional benefit accrues to them from Diesel engines. But, had these 15 engines been Diesel engines, the ships in which they will be installed would have carried at least 5,000 tons extra cargo per voyage. Hence the wicked waste.

Generated on 2024-09-13 08:57 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

The Submarine Patrol Question

Secretary Daniels' Testimony Before Congress

ONCE again we return to the submarine patrol question, this time because of the interesting testimony of the Hon. Josephus Daniels, secretary of the U. S. Navy, before the sub-committee on naval affairs of the House of Representatives on Wednesday, Dec. 19th, 1917. Many of Secretary Daniels' statements virtually corroborate the viewpoints of "Motorship" made in February, 1917, and in several subsequent issues, including at the time when the 110-footers first were decided upon by the U. S. Navy department. There are, however, several remarks which vary somewhat from our own impressions of then and of today, which we will deal with later.

In June last Motorship remarked that **"While we consider the 110-footers now being built for the U. S. Navy department as being better than those built for England, they are by no means ideal. As a matter of fact they almost represent the minimum of size and speed—more particularly size that sea-going chasers should have."** In his testimony Secretary Daniel's referred to the difficulty of getting motive power for "chasers," but we believe we are correct when we say that there are a number of responsible concerns, who would have been glad to have built submarine-type Diesel engines of reliable design for larger craft of this type and that it is not too late to do something along these lines. In fact we feel that "something" will be done before long with larger Diesel-driven submarine destroyers, it being the obvious solution to the submarine problem.

Let us now read the official naval viewpoint as given out by "The Official Bulletin" of Washington, D. C.

Mr. Britten—These 110-footers have not been as successful as we had hoped, have they?

Secretary Daniels—They have proven very valuable. We have a number of them in France.

Mr. Peoples—The French were glad to get 50 of them from us.

Mr. Britten—And the French commission were very much opposed to the style of construction and so reported, and as a result we are changing our designs, right now, are we not?

Secretary Daniels—I trust we are improving all the time. The English built the 85-foot chaser. There was some argument in the Navy Department when we began to build this small craft as to whether we should build the 85-foot or the 110-foot. There was some difference of opinion. I referred to the General Board the type of ship to be built. The General Board reported that we ought not to build any ships smaller than 110 feet. The English built 85-foot boats, but they had been unsatisfactory, as, indeed, our 110-foot boat would be truly called unsatisfactory if we desired to utilize it in place of a destroyer. You must utilize it for the purpose for which it is built.

Mr. Britten—It was built for that particular purpose, practically, was it not—the chasing of submarines?

Secretary Daniels—It might be a misnomer to call them submarine chasers. It would probably be more nearly accurate to call them patrol boats in harbors and smooth waters. The chief function of those boats is for patrol duty. We had no idea when we built them of ever sending any of them abroad, because they are not big enough to stand rough weather at sea. They are not the type of boat we would send out in the ocean for hard service. The truth about it is that the destroyer is the smallest boat we desire to construct, and in very high seas our old-time destroyers have a very difficult time. These 110-foot boats were primarily built to protect our coasts from submarines and to keep a watch and to keep them away from our own coasts.

Mr. Britten—Are we not arranging for larger chasers?

Secretary Daniels—No, we are not. We are not planning to build any more chasers. We have not decided to build any more. We do not put anything like the great reliance on them that we do on destroyers. We use them in the absence of larger ships. We would not put a dollar in a submarine chaser if we could get destroyers. The problem of getting ships in this country of any character is the motive power. We can build the hulls of submarine chasers rapidly, **but it is very difficult to get the motive power because the same people who are making motive power for submarine chasers, except one or two small concerns, are making motive power for destroyers and for merchant ships and for every class of ships.** We do not like to call upon these people at this time to supply motive power for these small ships if it can possibly interfere with the destroyer or the merchant craft. **Therefore we have no idea of building other submarine chasers at present.** Of course, as the war goes on, we may do so. We have no fixed policy.

Mr. Britten—Well, Mr. Secretary, what I had in mind was not with the view to criticizing anybody in the Navy Department, but I had heard from one of the French commissioners that the triple-screw idea did not turn out as well as you had hoped, and that one screw was almost lost action and occasioned the loss of a lot of power.

Secretary Daniels—Trials have shown that is not correct. Of course we have had some trouble with the submarine chasers, but the French opinion of these chasers is given in the following report by Admiral Benson: "In conference with the chief of the French naval staff the subject of the 110-foot submarine chasers transferred from this Government several of which have been delivered to the French Government, was discussed. I was informed by the chief of the naval staff that these vessels had proven even more satisfactory than they had anticipated, and that on a recent occasion where a convoy was being escorted along the coast and which encountered heavy weather the submarine chaser was the only one of the escort that continued with the convoy and escorted them into port, the convoy having started out escorted by a light cruiser and some destroyers and the 110-foot submarine chasers. The French naval officers felt quite sure that this type of vessel, if properly handled, would be most valuable and a vessel that could keep the sea under all ordinary conditions."

Mr. Hicks—I understand these chasers were intended ostensibly for on-shore cruising and not off-shore cruising.

Secretary Daniels—Of course!

Mr. Hicks—And for on-shore cruising you consider them a success?

Secretary Daniels—Yes, in other words, it was the only ship we could build quickly. If I could have built the destroyers I would not have built one of them. If I could have built larger ships I would not have built small ones.

Questioned in regard to the cost of the sub chasers, Secretary Daniels said the prices ran from $42,000 to $52,000 for the hull, not including machinery or armament. He said he expected the entire number to be completed and in service by spring. The chief function of the submarine chaser, he said, is to be eyes, scouts and patrols, but in an emergency they could give a good account of themselves.

At this juncture it will not be out of place to publish another remark on this question made in the June issue of Motorship, as Secretary Daniels has practically made the same declaration. It was as follows:

"Hitherto, the various domestic pleasure-boating journals do not appear to have been able to distinguish between the requirements of coastal or harbor patrol-craft and sea-going submarine chasers. Their tendency (and the daily-press unfortunately has followed their lead) has been to make motorboat and motoryacht owners believe that their craft, which mostly vary from 40 ft. to 90 ft. length, will be used by the Navy for submarine chasing at sea, whereas they actually are being, and will be, used for general police-work in harbors, sounds, bays, rivers, estuaries, and a few miles off shore, for which purpose they are most valuable, as they relieve larger vessels of the Navy of certain important duties that must regularly be carried out."

A British contemporary, in its issue of the 13th of December last makes some very interesting comments, fully in accord with "Motorship's" contentions so we give an extract, namely:

"There is scarcely any doubt of the next phase of the development of naval motor craft, following on the present 80 ft. M. L.'s, which are neither quite big enough, quite seaworthy enough, nor fast enough for the fulfilment of all the objects they have in view. To a certain extent they fall between two stools, being unnecessarily large for mere ordinary patrol work and not large enough nor sufficiently heavily armed to take the place of destroyers, which it was hoped they might do to some extent. No doubt many of the M. Ls. will be retained for some years, as they have a fairly long life in them, and it would be uneconomical to scrap them, but a new class will have to be built somewhere between 120 ft. and 150 ft. in length, or possibly more, for the express purpose of combating the submarine in all its phases. It must, in the first place, be able to keep the seas in all weathers, have a speed considerably in excess of the existing type of submarine, whatever that may be, and must be more powerfully armed; that is to say, in present circumstances, the boat should be over 120 ft. long, have a speed of not less than 20 knots, and be armed with a 4.7 or preferably a 6-in. gun."

"The absolute necessity for large numbers of such craft, which was not thought possible before the war, is now quite obvious. By the new methods of warfare, in which virtually every ship in the waters becomes liable to attack by submarine, it becomes a well-nigh essential for every single vessel flying the flag of a belligerent to be escorted even if it be carrying ordinary merchandise. When it is considered what this means to a nation with a widely-scattered Empire like our own, carrying on warfare in four different centers, the most remote 8000 miles away, with hundreds of ships sailing daily in waters several thousand miles in extent, known to be infested with submarines, it needs no stretch of the imagination to see that, if one or two destroyers are needed to escort each ship, the number of these craft detailed for this work, and thus not available for any other purposes, becomes extremely large. Moreover, a destroyer is really wasted in this work, for its excessive speed and its torpedoes are unnecessary, and it is this service that should rightly be carried out by the large, fast motor patrol boats of the type suggested."

"The main question to be solved in this problem is the type of engine to be employed. The power required is something between 1000 b. h. p. and 2000 b. h. p. and it would seem that the ideal motor for the work is the high-speed Diesel set, such as is utilized in submarines. So many of these machines have now been built, and such a wide and successful experience gained with them, that it is hardly possible to urge against them the disadvantage of unreliability. In fact, if such a suggestion is made, the obvious reply is that the submarines with which they have to deal are also driven by Diesel engines, and what applies to the one applies equally to the other."

It would be of interest to know if the British, like the French, possess some Diesel-driven submarine destroyer, apart from the famous "Hush" boats. In a special despatch by Henry G. Wales, of the International News Service, dealing with the sinking of five submarines in one day by allied patrol craft, the following sentence occurs: **"A tiny puff of white smoke, which melted into thin air as quickly as steam, showed over a British submarine-destroyer, a boat of the latest type, shaped like a needle, funnelless, and equipped with only two guns."** The description certainly sounds suspiciously like a Diesel-driven vessel, although these non-technical descriptions often are very deceiving.

SWEDISH WOODEN MOTORSHIPS.

In our issue of October last we referred to a new wooden motor ship-building yard at Norrkoping, Sweden. The first completed motorship from this yard, the "A. B. Norrkopings Varvs V. Verkstadts," has been delivered to her owners, Messrs Amels Bros., of the same town. It was completed in a remarkably short time, although of 725 tons d. w. c. Four sister motorships are under construction. Each is 150 ft. long by 28¼ ft. breadth, and can carry 650 tons of cargo, in addition to fuel, stores, etc.

The motor is installed aft, and is a 270 b. h. p. three-cylinder direct-reversible Avance crude-oil engine of the surface ignition type, giving the first vessel a speed of 9 knots. The fuel-consumption was said to be 132 lbs. an hour.

She will be used eventually for carrying fish from Iceland. The frames and planking are of oak. On deck there are two 2½-ton cargo winches and an anchor capstan, all electrically driven, current being furnished by an oil-engine driven auxiliary plant.

THREE NEW ITALIAN MOTORSHIPS.

Three Diesel-driven motorships recently have been launched by the Societa Ecercizio Bacini, of Genoa, Italy. The hulls are built on the Isherwood system.

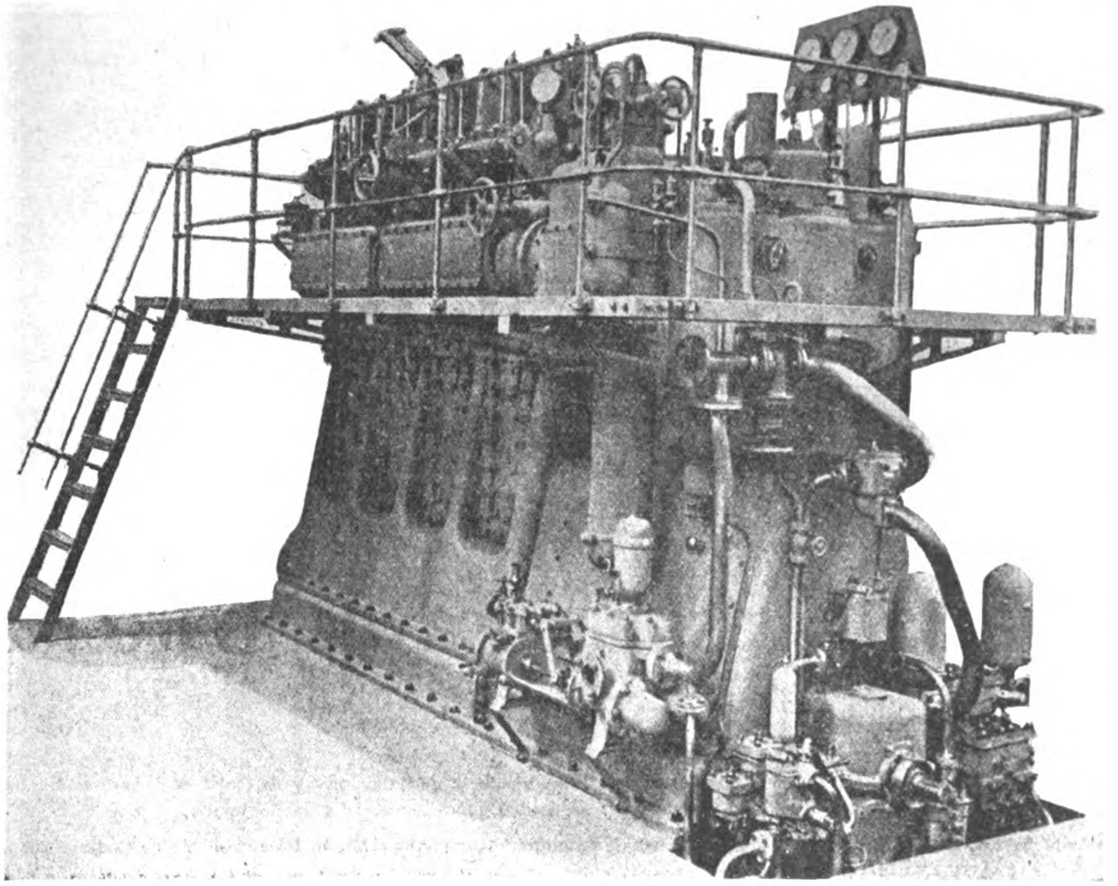
Generated on 2024-09-13 08:59 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

A Spanish-Built Marine Diesel Engine

Remarkable Encouragement by the Government.

HITHERTO Spain has not been closely associated with the development and construction of marine Diesel engines, and it may be remembered by readers of Motorship that it was this fact, combined with foresight, which caused the Spanish Government to encourage domestic engineering companies to undertake this work. The authorities hinted that they would give out orders for 36 Diesel engines of from 600 to 1000 b. h. p. and 18 engines of 400 b. h. p. to domestic concerns, the latter engines being for coastal patrol craft. The Sociedad Espanola de Constructione Metalicas of Madrid and Balboa, decided to take up marine Diesel engine construction, and purchased a license from Sulzer Bros. of Winterthur, Switzerland.

They are quite an important concern, having a capital of 18,500,000 pesetos ($3,330,000). The engine which we illustrate was built by them at their Zorroza (Balboa) works and is from designs by Sulzer. It is a four-cylinder direct-reversible model of the two-cycle type and develops 420 h. p. at 190 r. p. m. Although af a heavy-duty, moderately slow-speed type, we understand that this is the engine which has been installed in both the French and Spanish twin-screw patrol vessels, two being fitted per boat. It is a nice-looking engine and is of the port-scavenging class, the scavenging pumps and air-compressor being arranged at the forward end. We understand that this Spanish company built and engined the motorvessels "Soton" and the "Jose Llupart," which are craft of 1500 tons cargo capacity; the hulls were built at their Gijon shipyard.



A 420 B. H. P. SULZER MARINE DIESEL ENGINE BUILT BY THE SOCIETAD ESPANOLA DE CONSTRUCCIONES METALICAS. IT IS SIMILAR TO THOSE INSTALLED BY THE FRENCH GOVERNMENT IN TWIN-SCREW SUBMARINE PATROL CRAFT AND TURNS AT 190 R. P. M.

A Boiler-Maker's View of the Marine Oil Engine

OUR attention has been drawn to a somewhat curious, if not extraordinary, article that recently appeared in "The Navy and Merchant Marine," from the pen of one Paul C. Mulligan. Was the author not interested in the steam-boiler industry we should be inclined to regard some of the statements there in as the wanderings of a vapid mind and pass it by without comment. But, as it appears to be a blatant attack on the marine internal-combustion engine (the use of which enables boilers to be dispensed with) we have selected several extracts from the said article for publication.

That the statements of Mr. Mulligan do not represent the U. S. A. boiler interests in general we are confident. As a matter of fact every class of steam boiler, except one of a certain type, seems to receive condemnation at his hands, as well as the marine crude-oil engine.

Among the leading boiler interests there is a genuine recognition of the advantages and merits of the marine oil-engine, as witness the activity several years ago of Babcock & Wilcox in acquiring an important Diesel engine agency and the arranging of a number of constructional licenses with shipbuilders. Evidently this great and well-known boiler company recognized that the Diesel engine was bound to establish for itself an important place in the merchant and naval marine, and endeavored to arrange to adequately meet the situation when it arose. But some of the small boiler concerns do not seem to be great enough to take such a broadminded view of the situation, and preferred to oppose and block adoption of the oil-engine by attacking it tooth and nail. Natural laws of development will, of course, cause their own attacks to recoil upon themselves.

As often happens in certain cases, Mr. Mulligan made a splendid start, full of logical and reasonable argument, and with which ourselves, or others no doubt, fully concord. The remainder of his assertions and arguments we can leave to our readers to judge for themselves as to their inaccuracy or misleading tendency. The extracts we have made are as follows:

"A feature of prime importance to the success of these ships is the selection of a type of propelling power which will give our ships the greatest cargo-capacity and at the same time the greatest economy of operation that is consistent with maximum reliability and durability. Our marine power plants must compete with present and all possible future types developed by foreign builders."

"If a small part of the many millions of dollars and years of labor, that have been so freely spent to bring the heavy-oil type of engine to its present state of development, had been expended in adding to the economy and reducing the weight of the well-developed, flexible and reliable steam plant, it would not now be necessary to point out that no considerable advantage in fuel economy or saving in space has been obtained which justifies the high cost, expert attention or great weight of the clumsy and complicated heavy-oil engine."

"That the steam plant has been improved and reduced in size and weight to a point that gives the foreign heavy-oil engine no advantage, except for such special purposes as submarine propulsion, is due to the persistent efforts of the designers and builders who refused to regard the substitution of 'airflasks and auxiliary compressors in place of boilers,' or the complicated, heavily constructed and delicately adjusted oil-engine in place of the steam engine, as the marine power plant of the future. They have steadily improved the steam plant, during the period required to show the limited possibilities of the heavy-oil engine, and the modern steam plant can now give our merchant fleet tremendous advantages if highly superheated steam and the most compact types of marine boilers on the American market are utilized and developed to permit standardization."

"Records," says Mr. Mulligan, "show that a boiler explosion occurs every day in the year in the United States alone. There have been boats blown to pieces and men killed by the score, not to mention the millions in damage through fires started by explosions of the most commonly used modern types of steam boilers. Accident insurance companies and costly boiler inspection departments of cities, states and Federal Government have been developed and maintained to reduce the damage caused by the use of the dangerous but indispensable steam boiler."

"Its compactness and light weight permit installation of the boilers and engines, or turbines, within the small fore-and-aft space required for the latter in any ship, thus saving more machinery space and weight than any other marine plant for a given power and propeller speed."

"Reduced overall weight of machinery, as compared to Diesel-type engines, saves many times the difference in quantity and cost of fuel consumed."

"Elimination of costly delays for boiler cleaning and overhaul."

Obviously, the article in question was written purely to boost one particular type of steam boiler. We would like Mr. Mulligan to substantiate his various remarks by means of authentic figures and data.

SIX THOUSAND BRAKE-HORSE-POWER MOTORSHIPS.

Messrs. Wm. Doxford & Sons, Ltd., one of the great British shipbuilders, state in a letter to Motorship: "We have gained ample confidence from experiments of our demonstration unit to proceed at once after the cessation of the present crisis with marine oil-engines up to 3,000 b. h. p. at 70 revs. per minute."

This of course, means possible twin-screw freight and passenger Diesel-driven ships of 6,000 shaft h. p. (equivalent to 8,000 steam indicated h. p.). The U. S. Shipping Board must take steps to make sure that American shipbuilders soon can say at least as much,—the future of our merchant marine demands it! Their hands are tied without Federal orders. We are fighting for our future, so we must make preparations for the future while we fight! If we wait until after the war we cannot hope to catch up with those who have not waited. The writing is on the wall. Let us pay heed to it! Further delay is vitally serious!

SPANISH DIESEL-DRIVEN CONCRETE CARGO-SHIPS.

A ferro-concrete motorship of 450 tons displacement is now under construction at Barcelona, Spain, for freight service between French and Spanish ports. Her length is 112' by 23½' breadth and 11½' depth. She will have two masts carrying auxiliary canvas. Her main propelling element will be a Diesel-type crude-oil engine of 120 b. h. p. installed aft. At the same yard a ferro-concrete motorship of 1,500 tons d. w. c. shortly will be laid down.

FRENCH DIESEL-DRIVEN SUBMARINE DESTROYERS.

Up to the end of November last some of the French Diesel-driven submarine patrol vessels had run for 3,200 hours without the slightest trouble, and have covered up to nearly one hundred thousand (100,000) miles per vessel, although they are far from being high-speed craft. Yet there are some who still maintain that the Diesel type crude-oil engines are not reliable. At a later date we shall have more to say about these excellent war craft.

Generated on 2024-09-13 09:10 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

Two-Cycle *versus* Four-Cycle Trials

Remarkable Results From a Highly Important Series of Tests, Made With Submarine Diesel Engines of One Thousand Three Hundred Shaft Horsepower (1300 b. h. p.) Each by the Builders of Both

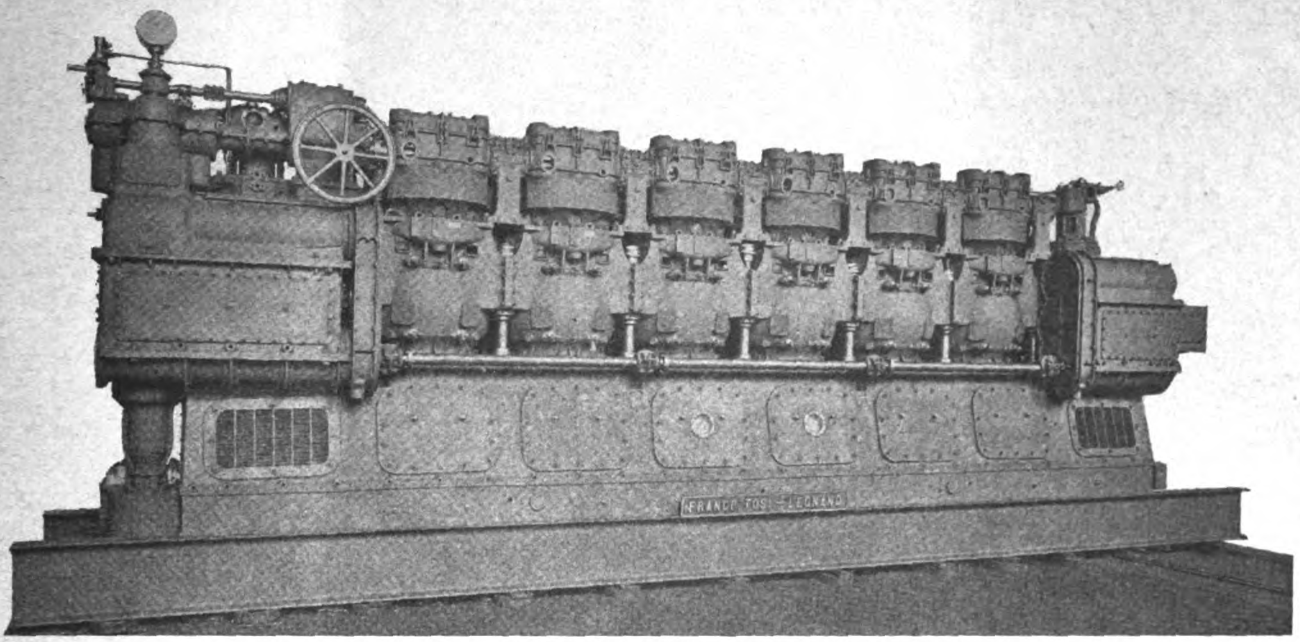
(Exclusive to "Motorship.")

By THOS. ORCHARD LISLE

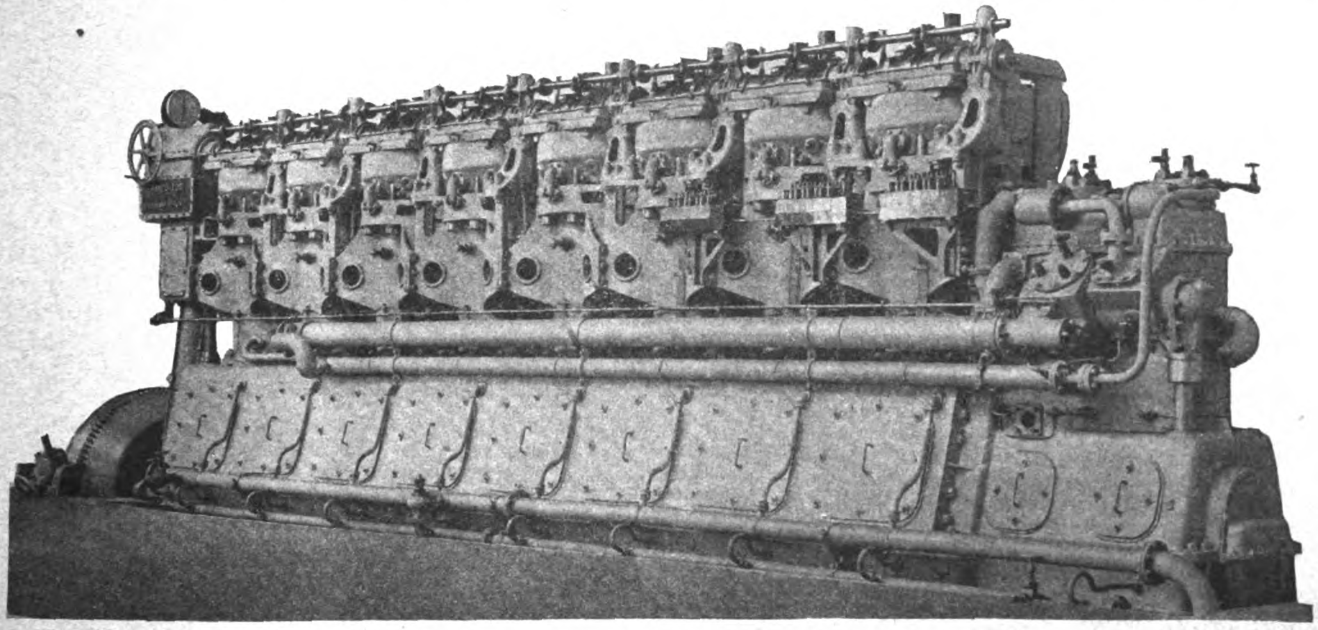
Assoc. Mem. Soc. Naval Engineers.; Assoc. Mem. Inst. Marine Engineers.

IN taking up our pen to write what we believe will be one of the most important articles on Diesel-engine lore ever written, it is with due serious realization that its publication will make a profound impression in the marine oil-engine world and that it may influence the trend of submarine machinery design with the various Admiralties; for, such valuable Diesel engine comparison data never before has seen the light of public print. Its great importance arises from the fact that both engines in question were designed, built, and tested by one company under naval supervision and the results caused them to abandon one of the types, necessitating a change of plans at no mean cost—and they are very experienced Diesel engine builders of many years standing, which makes the results more significant.

One super-result which must not remain unrecorded is that, although the firm in question still build marine steam turbines, boilers, and reciprocating steam machinery, they only continue such constructions above certain powers because there remain many ship owners who demand the same. But, they build marine Diesel engines and continue with experimenting and developing higher powers at an enormous cost to themselves, because they possess the true engineering spirit which supercedes their regard for the "excess profit" side of their balance books and because they fully recognize that the marine heavy-oil internal-combustion-engine possesses so many marked advantages over steam machinery that its true position as a superseder of the latter cannot be ignored, and that it now rapidly is taking its merited place in the mercantile and naval marine worlds as a propulsive and auxiliary power for ships.



THE TOSI TWO-CYCLE TYPE 1300 B. H. P. DIRECT-REVERSIBLE SUBMARINE DIESEL ENGINE



THE 1300-1500 B. H. P. TOSI SUBMARINE FOUR-CYCLE TYPE DIESEL ENGINE

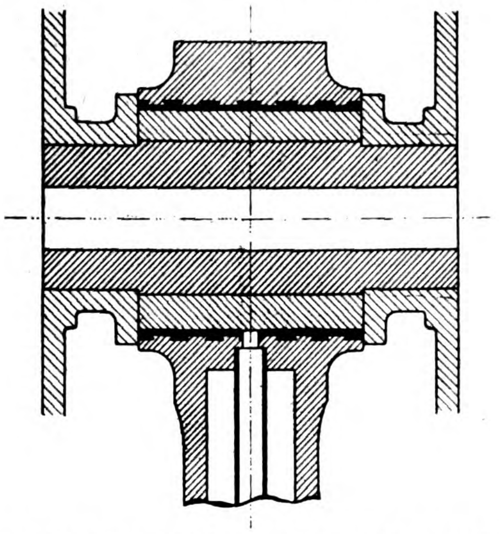
In placing the following interestingly valuable information before our readers we desire it clearly to be understood that our own attitude is one of strict impartiality and that we merely record progress and developments as they are. The policies of "Motorship" hold no favor for either the two-stroke-cycle or the four-stroke-cycle system of operation and design, except to assist readers by stating our opinion when necessary and where results undisputably are demonstrated. It is for oil-engine designers, builders, and owners to decide for themselves by means of thorough shop-tests followed by proper sea-going experiences as to which principle is the better for marine purposes. Engineers make the experiments in conjunction with owners—and—it is "Motorship" who distributes the information. While shop tests by themselves are not absolute determining factors, trials such as we herewith record are of very great importance.

Undoubtedly, this particular article reveals the registration of a distinct score for the four-cycle engine. But, now under preparation especially for "Motorship" is an important article giving the case on behalf of the two-cycle engine by the chief-engineer of one of the leading European Diesel-engine builders who have remained steadfast to that cycle through thick and through thin, and who undeniably have had splendid results. This story we intend publishing in an early issue and the same will be another example of exceptional editorial matter provided by "Motorship" for our readers.

Through the kindness of an Allied government and by the courtesy of the builders of the engines,

Generated on 2024-09-13 08:59 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

we are enabled to place these illustrations and engineering information before our readers. While it concerns the very latest European submarine practice (although not the highest powered engines) it is of no military use to Germany, yet at the same time it will form valuable engineering knowledge to oil-engine builders of the United States, where partly due to comparative lukewarm Federal support the merchant and submarine Die-

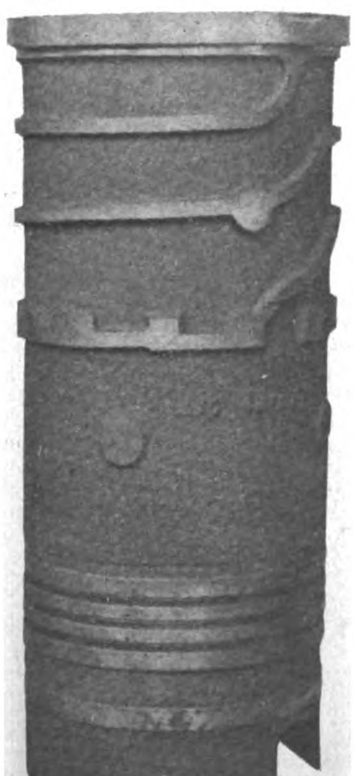


SPECIAL WRIST-PIN DEVICE WHICH AFFORDS A LARGER BEARING SURFACE THAN USUAL

sel engines have not been developed in such high powers as herewith are dealt. So we must express our appreciation of the excellent spirit shown by Allied and neutral authorities for enabling us to thus record progress in a proper manner by means of this and other articles. And, is it not to the advantage of the world to have the oil-engine developed to a maximum in order that the wicked waste of about 80% of the efficiency of oil and coal fuel up the smoke-stacks of ships may be avoided, and instead have these fuels utilized for power in the most economical manner possible—a sound and logical reason that cannot be overlooked!

The trials which we are about to describe were conducted by the Italian engineering firm of Franco-Tosi, the American stationary Diesel-engine licensees of whom are the Fulton Iron Works of St. Louis, Mo.; so in a sense the United States is directly concerned with the results of these tests.

We cannot reveal the number of submarines and submarine engines built; in fact the same has but



CYLINDER LINER FOR THE TOSI FOUR-CYCLE ENGINE

little bearing on the matter. It is sufficient to say that one submarine had two 1300 b. h. p. two-cycle type Diesel engines and another had two 1300 b. h. p. four-cycle engines, and both sets were given exhaustive shop tests before their installation in the 1000-ton submarines; one of the non-stop, full power, runs in each instance being of 145 hours duration. This continuous run of over 6 days and nights at full rated-load was very severe for a newly designed and built high-speed, high compression oil engine. It will be realized that the submarines are of large tonnage and of 3000 total normal shaft-horsepower each, so are nearly as big as many of Germany's recent U-boats.

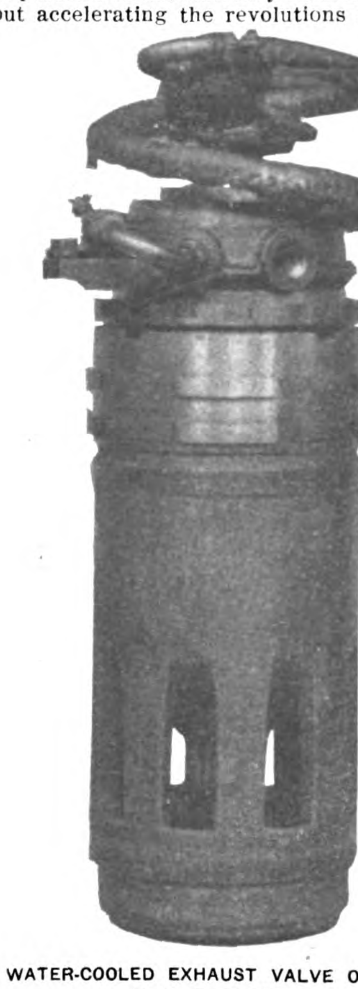
The two-cycle type Tosi-Diesel engine had six cylinders and was designed to develop its rated full power at 300 r. p. m.

The four-cycle type Tosi-Diesel engine had eight cylinders of practically the same diameter and stroke as the two-cycle engine and was designed to develop its full rated horsepower at the same revolution speed.

On the 145 hours continuous and uninterrupted tests the following results were produced, viz.:

Type of Engine.	Two-cycle.	Four-cycle.
Number of cylinders	6	8
Rated horse-power	1300	1300
Maximum power without increasing revolutions	1300	1450
Maximum power obtained	....	1585
Normal revolutions per minute	300	300
Fuel consumption per b. h. p. hour	0.540 lbs.	0.390 lbs.
Lubricating-oil consumption per b. h. p. hour	0.0180 lbs. or 8 gramms	0.0334 lbs. or 15 gramms

It will be noticed that with the four-cycle engine it was possible to considerably increase the power without accelerating the revolutions and possibly



TOSI WATER-COOLED EXHAUST VALVE OF THE 1300 B. H. P. ENGINE

this was obtained by increasing the air injection pressure and the amount of fuel injected. But this apparently was not feasible with the two-cycle engine because unless the revolutions were increased the volume of scavenging-air during a given period remained the same, and so the efficiency of the motor would tend to decrease rather than to increase.

The builders state that with their four-cycle engine the fuel consumption is very much less because it has fewer auxiliaries to drive and that the scavenging-pumps of the two-cycle engine require a very high percentage of the whole power produced by the engine; also that the combustible mixtures are not of the same purity due to the remains of burned-gases in the cylinders after each stroke which requires a higher scavenging air pressure and consequently higher absorptions of engine energy.

Apart from the very great importance of the considerably increased power—hence speed—obtainable in times of emergency with the submarines that are four-cycle Diesel equipped, the reduced fuel-consumption makes a tremendous difference to the cruising radius of the craft and the following are some comparison detail furnished us by Messrs. Franco-Tosi:

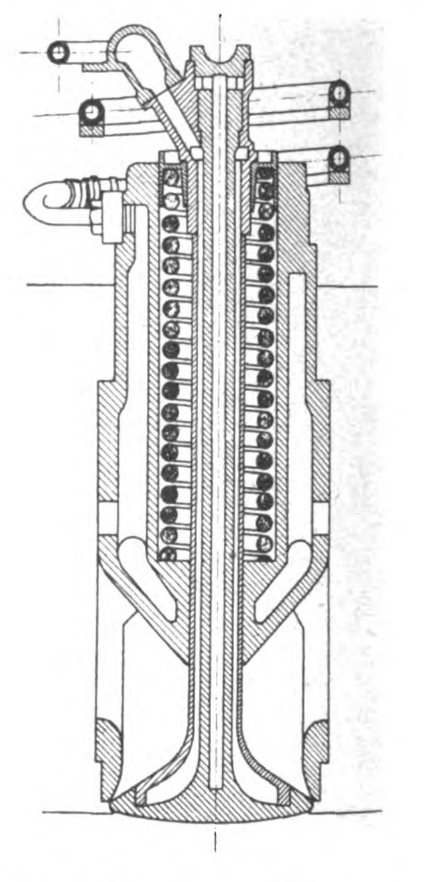
Motor Type.	2-cycle.	4-cycle.
Fuel weight	Kg. 6000	Kg. 6000
Fuel weight	lbs. 134400	lbs. 134400
Total h. p.	2 x 1300	2 x 1300
Power at cruising speed 10 kn.	1000 h.p.	1000 h.p.
Running with only 1 knot....		
Fuel consumption h. p. hours	250 gramms	180 gramms
Fuel consumption h. p. hours	0.560 lbs.	0.405 lbs.
Navigation hours	240	33
Action radius at 2 knots hour	2400 sea miles	3330 sea miles

Messrs. Franco-Tosi claim seven important reasons for having decided to abandon two-cycle Diesel engine construction, and in its stead adopt the four-cycle Diesel engine. We quote their own words as follows:

(1) Elimination of the scavenging-air pumps together with air receivers results in diminishing the size and shape of the motor and noise.

(2) The quantity of heat units (which have to be extracted through the cooling water for the valve heads and cylinders) per surface units is much less in the four-cycle type, as we have the suction and exhaust periods of the latter type. The same are not existent in the two-cycle type and so the four-cycle type will have a lower medium water temperature, and consequently means a longer life to the motor.

(3) The danger of the remaining combusted gas in the cylinder is completely eliminated: a danger which is existing in the two-cycle type with scavenging openings in the cylinders, as these gases remain in the upper end of the cylinder, which keeps the bottom of the valve-head and



SECTION OF WATER-COOLED EXHAUST VALVE

cylinder walls very hot, thus reducing the life of the whole engine very considerably.

(4) In the four-cycle motors the possible piston speed is much higher, and, as the medium engine temperature is much lower, a higher medium pressure can without inconvenience, be tolerated. That explains why the four-cycle engine is practically of the same weight as the two-cycle engine and also virtually of the same over-all size.

(5) Possibility of running the engine with greater regularity at low speed and with a lower number of revolutions in the four-cycle motor, for the fact that when reducing the speed of a two-cycle engine the cylinder compression falls very rapidly, because at low speed the scavenging-air pressure falls very much. Experiments show a two-cycle Diesel motor at 300 r. p. m. had a cylinder compression of 32 atmos. (460 lbs. per sq. inch): at a speed of 120 r. p. m. the motor shows a compression of only 22 atmos. (315 lbs. sq. inch) While the four-cycle engine at a speed of 300 r. p. m. with a compression of 34 atmos. (490 lbs. per sq. inch) maintains a pressure of 31 atmos. (44

Generated on 2024-09-13 09:02 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

Original from
NEW YORK PUBLIC LIBRARY

lbs. per sq. inch) at a speed of 100 r. p. m. With another four-cycle motor of 423 r. p. m. the compression equals 35 atmos. (500 lbs. per sq. inch) and at 80 r. p. m. the cylinder compression is 30 atmos. (430 lbs. per sq. inch).

(6) The mechanical parts of the four-cycle motor are much simpler and this is essential for the survey and for the supply of spare parts.

(7) It is possible to drive the fuel-pumps for each cylinder at half the number of revolutions of those of the two-cycle motor which factor guarantees good and sure service of this device.

[Editorial note.—The term "valve-head" refers to the detachable cylinder covers that contain the valves.]

Possibly it will be remembered that the New London Ship and Engine Co. of Groton, Conn.; Krupps of Kiel, and Vickers of Barrow, also abandoned the two-cycle engine in favor of the four-cycle for submarine work; but, Sulzers of Winterthur, and Fiat-San Giorgio have remained steadfast to the two-cycle principle. Schneiders of Cruesot, and the Societe des Moteurs Cha lasserie (Sàbathé) still continue to construct both four-cycle and two-cycle engines for this particular naval work, so, as yet experienced engineering opinion still is divided.

CONNECTING ROD OF TOSI FOUR-CYCLE ENGINE SHOWING SPECIAL WRIST-PIN BEARINGS

However, as Franco-Tosi (whose chief work is marine steam turbine building) have "no axe to grind," the results of their experiments will no doubt mean the deepest investigation by all submarine engine builders, and, as we previously have mentioned in this article, may have not a little influence upon the future trend of naval design.

Before dealing with further tests made with the Tosi four-cycle 1300-1500 b. h. p. submarine Diesel engine, we propose to give a brief technical description and we include some unusually comprehensive illustrations, some of which are entirely new to Diesel engine design.

There are eight working-cylinders and these are mounted on a cast steel box-frame and bed-plate, and the stresses of combustion are absorbed by steel columns, which pass from the upper part of the cylinder down to the bedplate, so that the cylinder walls and liners do not have to take up any of the strains. The camshaft is mounted over the cylinder heads and is in sections, so as to render easy and rapid the removal of the cylinder covers. It is driven by a vertical shaft having helical gears at each end, and this shaft in turn is driven off the crankshaft at the after end of the engine. It is entirely enclosed, and also operates the fuel-pumps and the special safety governor.

At the forward end of the engine is a four-stage compressor in two separate frames. Piston-valves are provided for the low and medium pressure cylinders, while the other stages have automatic poppet valves. The coolers it would be noticed consist of two long pipes run in the length of the engine and arranged just above the crankpit frame.

A most interesting feature of the design is presented by the cylinder liners, which are of a new and patented form. It will be noticed from the illustration that there is a helical rib around the upper part, so that the water entering at one end must flow around every part and no dead water pockets can possibly form.

Almost exactly the same patented feature has been adopted for the piston cooling, and the drawing and photograph afford a better description than words can give. The helical canals through which the cooling-oil passes at high speed prevent carbonization, and form a very good heat transmitter. It is claimed by the builders that with this patented system the same results can be obtained as with ordinary piston water-cooling devices. The piston, by the way, is in two sections.

A special design of cylinder head also has been incorporated in this engine and its cooling passages are so arranged as to guarantee uniform expansion of the lower end with that of the upper end and thus avoid cracks.

[Editorial note.—Messrs. Franco-Tosi refer to twelve by one hundred expansion strengths and the translation from the Italian language does not make clear their meaning, so doubtless they will inform our readers at a later date.]

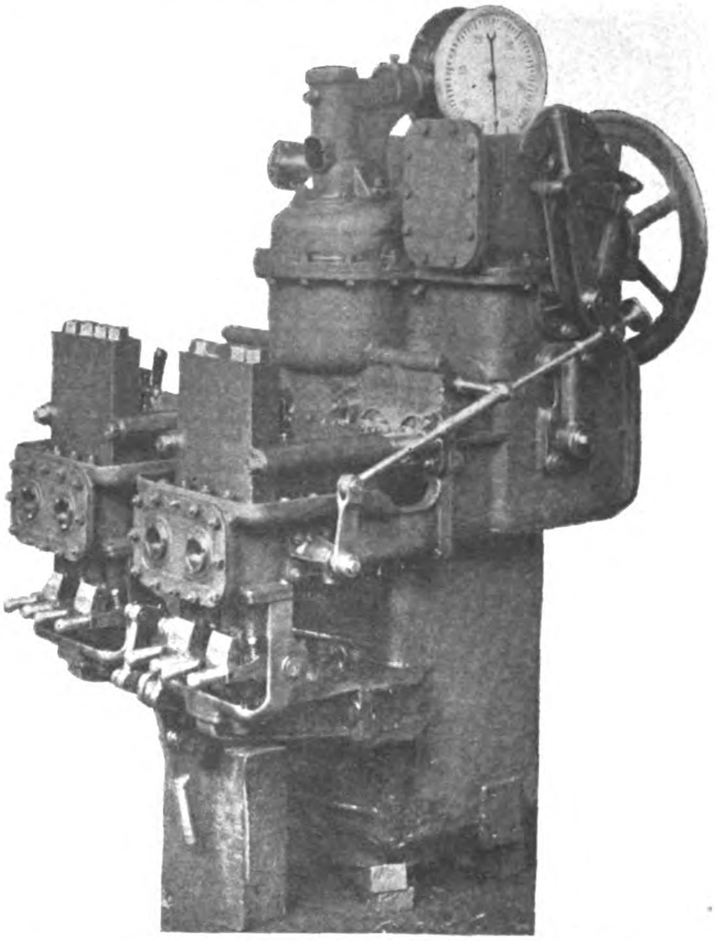
There are two inlet-valves and two exhaust-valves per cylinder, which, together with the fuel injection valve, make five orifices in the cylinder head; and it is becoming an established fact with Diesel construction that many well-designed orifices in the cylinder covers are better than one badly-designed orifice.

Regarding the cylinder valves the inlet-valves are not cooled but the exhaust-valves are water-cooled, and we give a drawing and a photograph of one of them which clearly denotes the cooling arrangements. This cooling device also is patented.

Undoubtedly the crankshaft is a beautiful job. While we have not the dimensions we presume it is between 9" and 10" in diameter. It is in two sections and the compressor cranks which are coupled to the crankshaft are provided with counter-weights in order to balance all free power and movements and to obtain an equivlocated engine.

Another new feature can be seen in the drawing and photograph of the wrist-pin and connecting rod. A sleeve is fitted on the center part of the wrist-pin and the outer side of the sleeve forms the bearing, so that a much longer bearing surface is obtainable than otherwise would be the case.

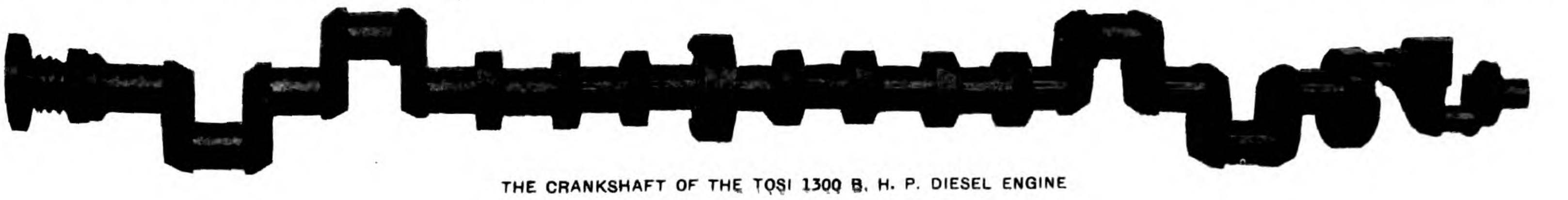
Efficient and reliable lubrication is one of the most important features of the successful Diesel engines, particularly the high-speed submarine type and it is comforting to know that in this connection American engineering plays a prominent part, for this new Tosi four-cycle engine is fitted for cylinder lubrication with force-feed lubricators built by the McCord Lubricator Co. of Detroit, Mich., and these plainly can be seen in the general view of the engine.



FUEL-PUMP GROUP AND CONTROL STATION OF TOSI 1300 B. H. P. FOUR-CYCLE ENGINE

There are three lubricators installed on each of these engines and each contains a number of pumps. Each pump unit in turn consists of a cast body hung from the top of a reservoir containing two pump plungers, which are connected at the top by a "crosshead" and actuated vertically by another "crosshead" attached to the stroke-shaft, the latter being worked by an eccentric that is rotated by a ratchet-mechanism off the engine.

In operation the primary plunger on its upward stroke draws the oil from the reservoir and on its return stroke delivers oil through a sight-feed, whence it is drawn by another plunger that is on its upward stroke and so is forced under pressure by the downward stroke of the same to the part of the engine to be lubricated. The amount of oil to be delivered by each feed is determined by means of adjusting nuts which are hand regulated. On the engine itself are mounted strainers and

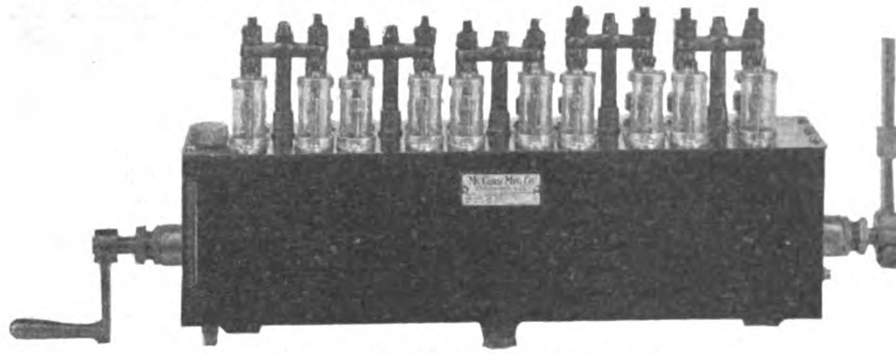


THE CRANKSHAFT OF THE TOSI 1300 B. H. P. DIESEL ENGINE

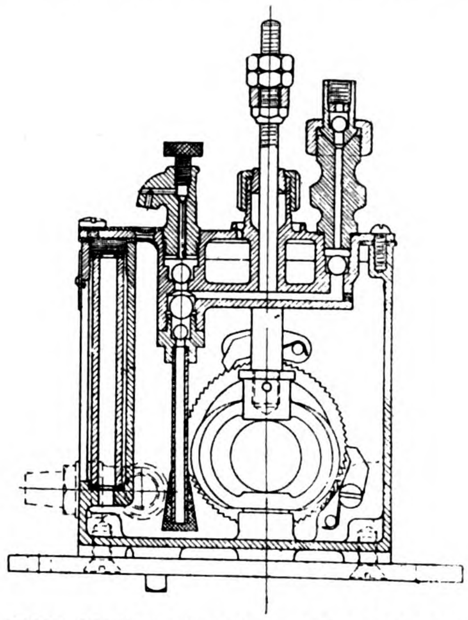
Generated on 2024-08-19 14:30 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

coolers so as to assure of a clean and cool oil supply.

The engine cooling-water pump is of the centrifugal type and is electrically driven by means of a dynamo mounted on the engine and actuated by a vertical shaft. This electrical drive is quite new to the marine Diesel engine design. The oil pump for the main bearing lubrication also is electrically driven by its own dynamo and delivers at a pressure of 10-15 lbs. per sq. inch. We now come to the fuel pumps. Each cylinder has its own pump and the batteries (two or four pumps each) are arranged on a special control station at the forward end of the engine. All are run at half engine speed and the entire set of pumps is controlled as a unit, or individually when desired, by hand and also is under an independent control from the safety governor. This governor puts the whole group instantly out of service if the engine speed exceeds the normal by more than 15%.



THE McCORD FORCE-FEED LUBRICATOR



CROSS SECTION OF THE McCORD FORCE-FEED LUBRICATOR

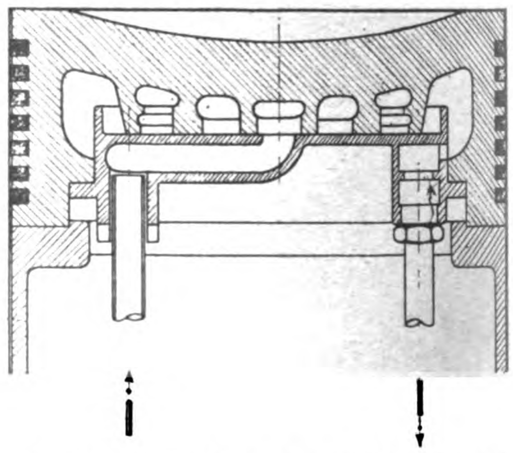
It may be remembered that the 1300 b. h. p. two-cycle Tosi submarine engine (which we described in our January issue) was direct-reversible, but the Navy officials locked the reversing device as it was not needed. The four-cycle type engine just described was built non-reversible and without air-starting valves; starting and reversing being carried out by means of the big electric motors with which submarines are equipped for running under water.

In addition to the 145 hours continuous test at full rated power, these Diesel engines also made an 120 hours non-stop run. We also are enabled to give data concerning some shorter tests which are of considerable interest.

First Test—Motor.	
Period of test	145 hour
Number of cylinders	8
Full power test hours	36
Correspond power	1300 b. h. p.
R. P. M.	300
Fuel consumption per h. p. hour	175 grammes
Fuel consumption per h. p. hour	0.390 lbs.
Second Test—Motor.	1300 h. p.
Test at ¾ load	96 hours
Correspond power	950 b. h. p.
Correspond r. p. m.	260
Fuel consumption per h. p. hour	182 grammes
Fuel consumption per h. p. hour	0.410 lbs.
Third Test—Motor.	1300 h. p.
Test at ½ load	12 hours
R. P. M.	240
Fuel consumption per h. p. hour	195 grammes
Fuel consumption per h. p. hour	0.438 lbs.
Fourth Test—Overload Test.	1 hour
B. H. P. medium	1485
Maximum b. h. p. per few minutes	1585

During these tests, say Messrs. Franco-Tosi, the engines were running without the slightest vibrations, and very silently. While, on the other hand, with the two-cycle motor running, the noises produced were so strong that it was impossible for a man to hear a word which had been spoken by another man near him.

INTERIOR OF THE PISTON TOP SHOWING HELICAL OIL-COOLING CANALS



SECTION OF PISTON TOP, SHOWING OIL-COOLING ARRANGEMENTS

THE "YSOBEL MAY."

Christmas Islands have sent their one motorship to San Francisco with a load of copra. These mid-Pacific islands are ruled by Father Bougier, who treats the natives in the manner of the Sixteenth Century priest who came to America to convert the natives and incidentally to see that they worked hard while acquiring salvation. Among shipping men Father Bougier bears a dual reputation, some claiming he is a saint and others cursing him for a pirate. Whatever his character he is up to date in his means of communication and has fitted up the little 88-ton schooner "Ysobel May" with an 80 h. p. Union engine, and sent her out to trade with the world. She came to San Francisco by way of the Hawaiian islands, under the command of Captain Begole, who is returning to France to fight in the navy of his native country.

WHY AMERICA MUST HAVE MOTORSHIPS!

Apropos the "editorial leader" in the November issue of Motorship the following extract, from an excellent article by Isaac F. Marcosson in the "Saturday Evening Post" for Jan. 26th, on "Preparedness for the Trade Conflict of Peace," ably supports our contentions that it is vital for America to have a type of ship that will enable our traders to compete in the world's markets on an equal basis with other nations:

"Despite her losses through the submarine—replacement is now almost equal to destruction—England will have more ships than anyone else; her freight rates will be cheaper; she will do a large part of the carrying business of the world. Her old shipping rival, Germany, will be depleted by loss, seizure, and decay of tonnage during the rotting years of internment."

We desire a merchant marine second to none, and, in order to compete with British and foreign steamships and Diesel ships, it is imperative for the United States to build and put afloat a large motorship fleet. Otherwise our present hopes and endeavors will virtually be doomed to disappointment and failure, because our steamships cannot compete in normal times with the more economically operated steam and motorships of Japan and of European countries.

FIRE ON "SELANDIA."

Just before the motorship "Selandia," belonging to the East Asiatic Co., Inc., was scheduled to sail from San Francisco for Kobe and other Oriental points, recently, a fire was discovered in one of her holds. While no serious damage was done the fire was stubborn and the sailing of the vessel was held up on its account. The cause of the fire was not announced to the public.

NEW MOTORSHIP TO SAIL FOR ORIENT.

The new motorship "Erris," belonging to the Erris Motorship Co., of Portland, is in San Francisco harbor taking on a general cargo for the Orient. The "Erris" is registered at 2500 tonnage, and her dimensions are 250x43.4x18.10. She is equipped with two 300 h. p. Winton oil engines. The "Erris" was recently completed at the yards of the Peninsula Shipbuilding Co., Portland, Oregon, and made her first trip to sea when she came to San Francisco. As she made the run down the Coast in 74 hours, her San Francisco agents, A. O. Anderson & Co., consider that she made excellent time.

Numbers of sailing vessels on the Atlantic coast are having oil engines installed, and are reaping big benefits due to their ability to make schedule time and also due to the abnormal freight rates.

ACCIDENT ON M. A. "PORTLAND."

A serious and nearly fatal accident occurred on the motorship "Portland" while she was laying at the wharf in San Francisco harbor recently, in which three men were badly burned and the engines damaged in an explosion which followed an attempt to start the engines by the use of oxygen. The engines were dead and as usual the cylinders were well coated with heavy oil. No compressed air being available at the time someone suggested that compressed oxygen would do quite as well and as a cylinder of the latter was available its use was attempted. The oxygen uniting with a heavy gas arising from the oil made a violent explosive mixture which fortunately found a weak spot in the valve of the cylinder so that the full force of the explosion was not felt. Had the cylinder been stronger in all its parts the explosion would have done much more damage and might have sent the vessel to the bottom. The cause of the explosion was not apparent at first and some effort was made to lay it to maliciousness, but as soon as the incident of the oxygen was told the cause became at once apparent.

AMERICAN PETROLEUM OUTPUT.

During 1917 the oil produced and marketed in the United States reached the record total of 341,800,000 barrels (45,971,427 tons or 13,672,000,000 gallons) exceeding the production of 1916 by 14%. Oil is a wonderfully valuable asset of America; but it is a wicked waste to burn it under boilers, when the best types of crude-oil internal-combustion-engines have a thermal efficiency of 38 per cent, and are just as reliable in operation as steam machinery, and certainly give less trouble than boilers.

Generated on 2024-09-13 09:00 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

A New Marine Motor

Gas and Oil Engine Construction by the Rathbun-Jones Engineering Company

GENERAL indications tend to show that within a few years the commercial marine internal-combustion-engine business, regardless of war conditions, will be one of the most important of engineering industries in this country, and, of the various branches of this industry, that of the marine heavy-oil engine undoubtedly will be the greatest. America's intention to have a great merchant marine will mean much to the oil-engine industry, because to have a successful after-war merchant fleet it is imperative for economy of operation to be relied upon to its utmost limits in order to secure competitive efficiency, for which we must conservatively utilize our wonderful oil supply. So motorships are the only answer, and motorships mean an abundance of small and moderate powered internal-combustion-motors, as well as big propelling oil-engines.

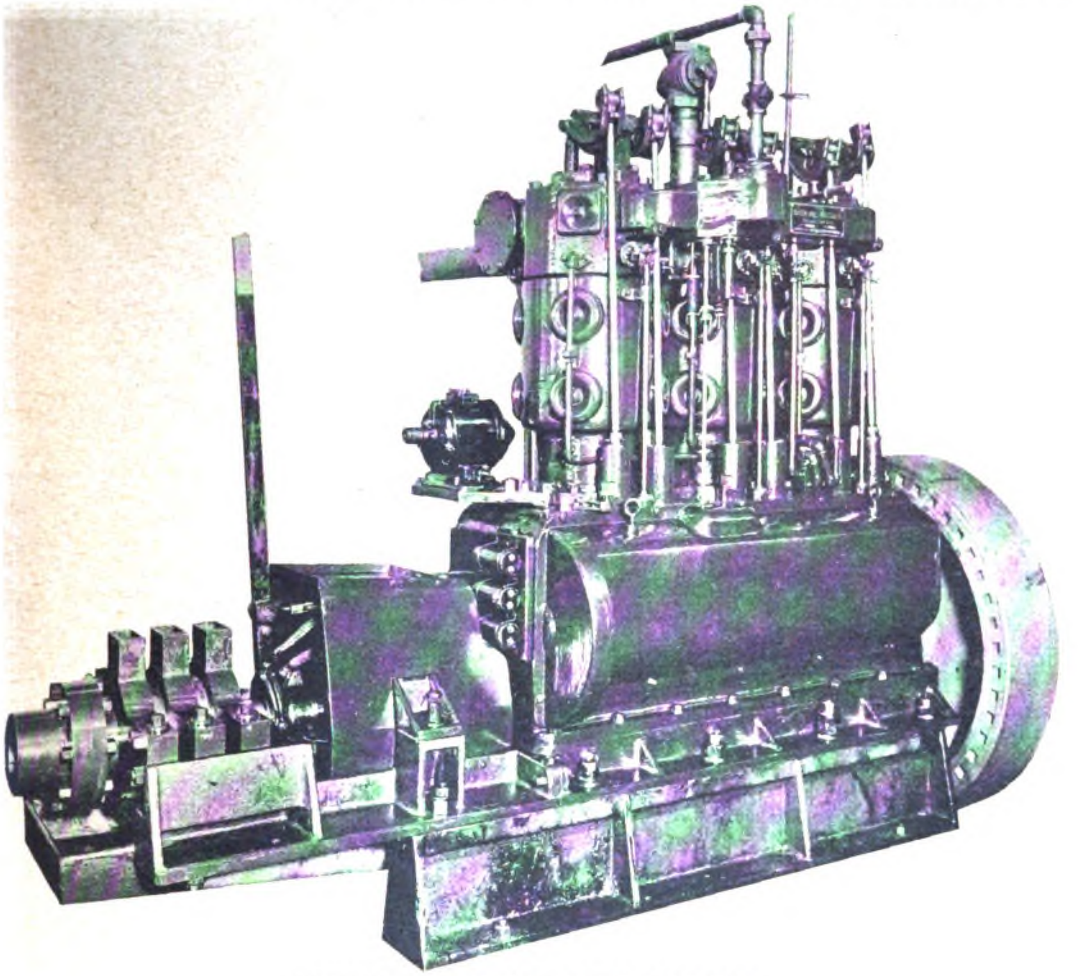
However, there is another very economical form of internal-combustion-motor, which will not be overlooked, particularly for inland water navigation in the hard-coal districts, viz., the motor designed to use producer-gas as fuel.

Reference to this class of propelling machinery makes us reflect over the truly wonderful versatility of the internal-combustion-engine, compared with the earlier form of power, viz., steam. The steam engine has only one method of power production, and that is the generation of steam in boilers by means of wasteful burning of oil or coal.

The internal-combustion-engine in distinct contrast can directly combust mineral and vegetable oils, or it can combust oils extracted from various kinds of coals including brown coal, and in the near future probably will use directly injected pulverized coal-dust, which already has been demonstrated in shop experiments, and it can efficiently use gas generated from coal, and it is an engine of this latter class that we are about to describe.

In Toledo, Ohio, there is an engineering concern who has been building stationary gas-engines for many years, so are better known to power plant engineers than to ship owners. Being possessed of reasonable business foresight, they have anticipated the great future that is promised to the marine engine field, so have turned their attention seaward. Recently we paid a visit to their works, and satisfied ourself that they will make good in their new venture—the class of design as well as workmanship, being above the general average. Also they seem to have grasped the fact of accessibility being a fundamental necessity aboard ship, where space does not compare with that available in electric generating stations, and other kinds of power houses.

We refer to the Rathbun-Jones Engineering company, who, in addition to building their own producer-gas marine motor, have undertaken the construction of the new Price-Rathbun solid-injection heavy-oil engine, which was designed by M. William Price, late chief engineer of the De la Vergne Oil-engine Works of New York City, which recently was purchased by Cramps of Philadelphia, and about which engine we shall have more to say at a later date.

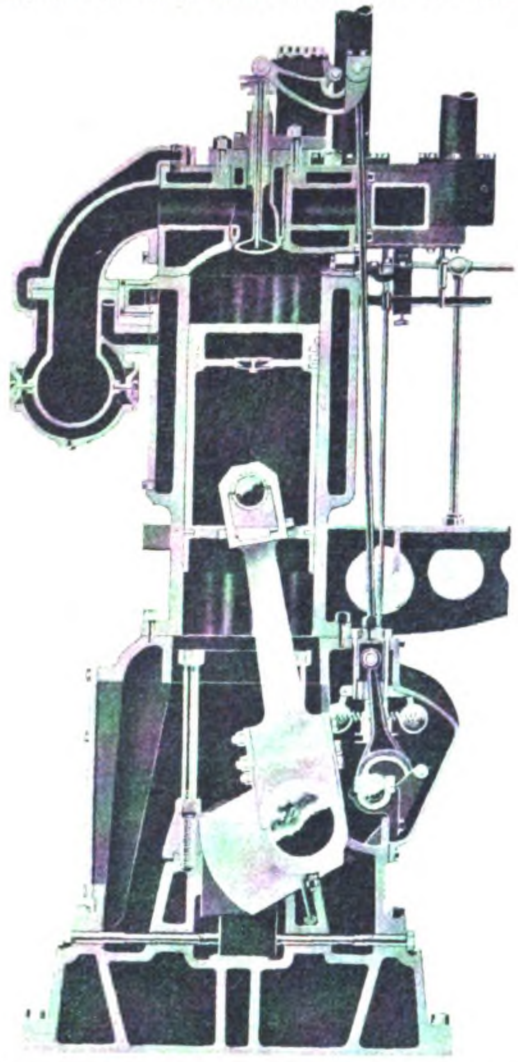


THE 90 B. H. P. RATHBUN MARINE GAS ENGINE

For the present, however, we propose to deal only with the Rathbun gas engine. The first of these engines have been installed in an oyster boat owned by Mr. Isaac Fass of Portsmouth, Va. It is a 3-cylinder 10¾x13" non-reversible model of the four-cycle type rated at 90 b. h. p., and is installed in conjunction with a Galusha producer built by the Nelson Blower & Furnace Co. of Boston, Mass., while reversing is obtained by means of a mechanical gear of standard type built by the Snow & Petrelli Mfg. Co. The boat is 65' long by 18' breadth. The amount of space taken up by this machinery is but 15'. In actual service about 80 b. h. p. is developed continuously and the consumption of coal is 70 lbs. per hour, this coal costing about $6 per ton, which of course means most economical operation. Records of the lubricating-oil consumption were not available at the time of our visit, but in the case of the stationary type Rathbun vertical gas engine, having three cylinders 19½"x19" at 225 r. p. m., running 14 hours per diem at 100% load factor, the oil used was but 5 gallons per week. We have no doubt that such economical consumption could be attained at sea, where even the varying temperatures have an effect on the amount of oil used, but in itself the result is most interesting.

Turning to the sectional illustration, it will be noted that the valves are in the cylinder head, which are detachable. The valves are actuated by a roller-path motion by means of long push-rods, the latter being operated by means of eccentrics instead of by the usual cam-and-tappet motion, and this produces exceedingly quiet and vibrationless running. By means of the roller-path valve actuation motion, the opening and closing of the valves are perhaps even quicker with sharp angled cams, allowing of good control and timing. To the upper ends of the eccentric-straps are piston guides, which appear to be a new introduction to the marine field.

It is in the bearings that one of the chief interests of the engine rests, they being of the adjustable type. Every engineer knows that with a single-acting engine all the wear on the bearings is on the lower half, and that when the bearing is worn the removing of a shim and the tightening of the bearing caps often springs the shaft and other bearings then run hot. For this reason the Rathbun designers consider that the only type of bearings for marine work is one with which the lower half of the bearing can be raised to the correct position when worn, so they have adopted the wedge adjustment principle, which clearly is depicted in the sectional illustration. To adjust the wear, all that is necessary to do is to slacken on one of the two bolts that controls the portion of the wedge under the bearing, and to tighten the other and this adjusting can be carried out to a minute fraction without springing or straining the crank-shaft.



SECTION OF RATHBUN ENGINE SHOWING DETAILS OF CONSTRUCTION

ANNOUNCEMENT.

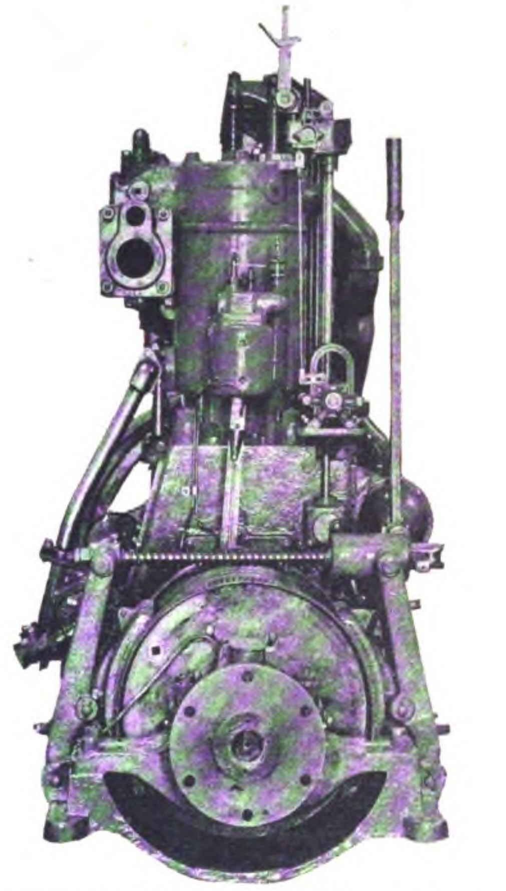
Owing to circumstances not under our control Motorship has been obliged to hold over until April a very important illustrated article dealing with the remarkable motorshipping developments abroad. This article when printed in the April number will cause a profound sensation.

The Atlas Imperial Gas Engine company is averaging an output of ten engines a day. A recent delivery of a $55,000 Diesel engine to the Apex Fish company, Seattle, Wash., is worthy of notice. This large engine was lifted by the company's enormous electric crane, placed on board for shipment entirely in one piece.

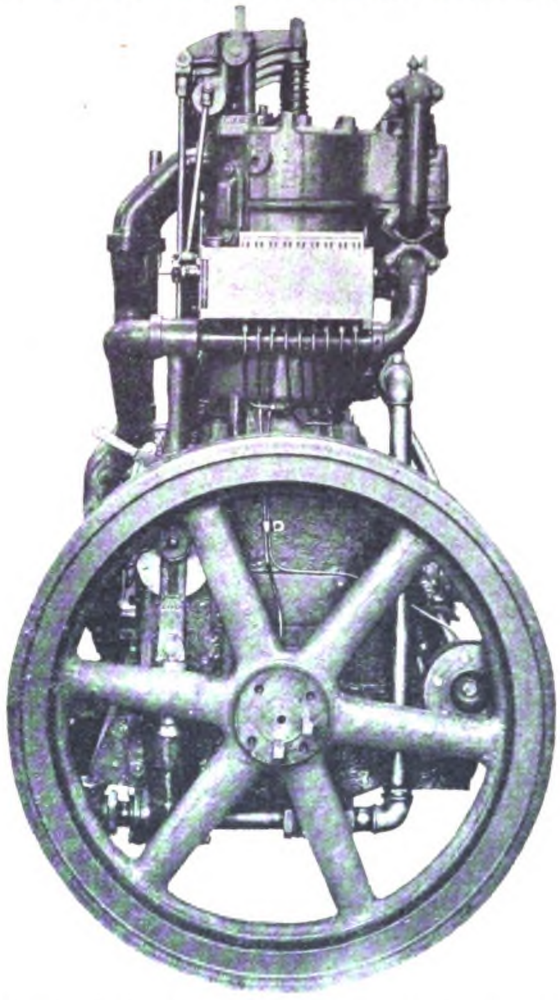
Generated on 2024-09-13 08:57 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

The "Acme" Engine

THE accompanying photographs are those of the front and rear views of the 65 b. h. p. Acme engine of which the port and starboard views were shown in the February issue of Motorship. In these photographs, as in the foregoing ones, the compactness and simplicity of arrangement will be noted. By looking at the rear view, you will note that the air-pump is situated at that end instead of at the forward end, as in many other heavy-duty engines. The reason for placing the air-pump on this end is to keep the fly-wheel as close to the forward bearing as possible. In the case of an engine which has its air-pump on the forward end and which is driven by an eccentric on the crankshaft between the forward bearing and the fly-wheel, the fly-wheel is over 2 feet away from the main bearing, causing a great deal of wear upon it. This is accentuated in the case where the manufacturer drives a plunger water circulating pump by means of an eccentric, also on the crankshaft, between the fly-wheel and the main bearing. In the Acme engine the fly-wheel is brought close to the main bearing, doing away with the overhang and the consequent wearing of the bearing. On the rear end it will also be noted that the magneto is connected to the advance lever so that in advancing the spark the magneto advances with it, with the result that the electrical energy is taken from the magneto at the proper time. All controls are placed so that the operator can reach them from one position.



From the front end, the water by-pass from the cylinder to the head is very clearly shown, the asbestos gaskets used on heavy duty engines, where the water is passed through the cylinder to the head without the use of by-passes, being eliminated. This does away with a great amount of the difficulty in making the asbestos tight so that the water does not get into the cylinders. The plunger water circulating pump is driven by the cam shaft. The lever near the fly-wheel is the relief lever for use in starting the engine. This was placed on the front end so that the operator could engage or disengage it when starting the engine, without having to leave the place where he is standing. This feature of being able to throw the relief in or out quickly is of great assistance to the operator. The mechanical oiler is also shown on the front end—it is mechanically driven. The oiler was placed on the front end instead of on the exhaust side of the engine so that it would be more convenient to the operator to fill, adjust or look after.



GERMAN ELECTRICALLY CONTROLLED MOTOR-BOATS.

The electrically controlled motorboats used by the German navy during a fight last fall off the Belgium coast were not "wireless" controlled as may have been presumed, so it is not surprising that their use was unsuccessful. The following is the report of the British Admiralty:

"The electrically-controlled motor-boats used by the enemy on the Belgian coast are twin petrol-engined vessels which are partly closed-in and travel at a high rate of speed. They carry a drum with between 30 and 50 miles of insulated single core cable, through which the vessel is electrically controlled. In the forward part, the craft carries a considerable charge of high explosive, presumed to be from 300 lb. to 500 lb. in weight.

The method of operating is first to start the engines, after which the crew leave the boat, the man in charge of the electric plant ashore guiding the craft by means of signals given from a seaplane, which, protected by a strong fighting patrol, accompanies the vessel at a distance of from three or five miles and indicates to the shore operator which direction she should take. These signals need only comprise port, starboard, or steady, and, whether intentional or not, the boats are zigzagged while running their course, and on being steered on to a ship the charge of high explosive would be fired automatically, but experience has proved that this system for the destruction of our craft is but another of the German failures."

FUEL OIL STATIONS FOR SHIPS.

Sir Marcus Samuel, head of the British interests of the Royal Dutch Petroleum Co. (Shell), writes us that "it is the firm intention of his company (Asiatic Petroleum Co.) to widely extend facilities for fueling of motorships, and that in the course of time, there will not be any port of importance regularly used by shipping which will not have its fuel installation." This news is of great moment to motorship owners.

The Union Gas Engine company has completed the installation of the power equipment of the "Palawan" which made her trial run a few days ago. Captain Taylor is master of this vessel which is owned by Atkins, Kroll company, San Francisco. The "Palawan" will make her maiden voyage to Napier, New Zealand, with a cargo of case coal oil. The engines are two 110 horsepower Union gas engines driving twin screws; also Union Gas Engine company equipment for the hoisting gear and windlass hoist.

Re Motorships and Their Operation—M. S. "Starlite"

To the Editor, Motorship:

Gentlemen—Having just read your article in the January number of Motorship regarding the auxiliary motor schooner "Starlite," belonging to Standard Oil Co. of N. J., I beg leave to say a few words regarding the engines in the six schooners. I will quote the "Sunlite," as I was first assistant engineer on her from Toledo, Ohio to New York, and thence to Buenos Aires and back to New York.

We had absolutely no trouble during the run from Toledo to New York. In New York we had the lubrication system to the gudgeon pin changed from the oil entering through the end of a hollow pin as originally; the gudgeon pins were plugged and an oil hole was bored through the port side of the piston into the pin. A brass collector plate was put in a groove in the piston and the oil was fed in this way to the bearing. We had no trouble with this arrangement. Several days out of New York we blew up the air compressor on the second assistant's watch (who, by the way, was an unlicensed man). The accident was due to an excess of oil being fed to the high pressure cylinder, the clearance between the piston head and cylinder head being practically negligible. We ran several days at slow speed without the compressor, till we picked up the "Dawnlite," with her engine totally disabled, due to bearing trouble. We took the "Dawnlite's" compressor and put it on our engine and took the "Dawnlite" in tow for thirteen days, 2,000 miles to Montevideo.

It was while the engine was doing double duty that thrust bearing trouble developed, but not enough to cause a shut down. We had no other trouble during the trip and made practically a non-stop run of forty-seven days.

In "Campana," a little town above Buenos Aires, where the Standard Oil have their own machine shop, we had some of our main bearings relined without touching the others; also new rollers and plates made for our thrust bearing.

Imagine on a six-bearing crank shaft having three bearings relined without removing the shaft and lining them all up. Is it any wonder that the new bearings, which were, of course, higher than the old ones, burned out within six hours after starting up? We scraped them in ourselves and went to sea with them.

The new rollers which we had made for the thrust bearing turned out to be too soft in one set and so hard in the other set that they chipped. We eventually got into New York with a thrust block made of Quebracho wood. We burned out two crank pin bearings twice, due to the shaft having moved ahead because of the worn thrust bearing. The chief engineer would not stop when the white metal went out of the bearings, and the crank pins were scored worse than any I have ever seen. It took us five days to true the pins up and rebabbit the bearings, having no new bearings on board. To make matters worse our dynamo had burned out and we had no light for four days while we were fixing that.

The whole trouble on the return trip was due to criminal negligence on the part of the chief engineer putting to sea without the necessary repair work (which was very little compared to the other ships) being done. I am under the impression that we made a record on the out trip through towing the "Dawnlite" 2,000 miles, and we lost the chance for a good trip back through negligence of the chief alone, we having no trouble except bearing trouble, and that was no fault of the engine builders. I have handled several Bolinder installations before and have found them to be quite all right if given reasonable care.

Trusting that you will accept this in the same spirit in which it is written. But I could not resist the temptation to say a few words,

I am yours truly,
ENSIGN JAMES E. PRICE, U. S. N. R.,
Care 25 South St., N. Y. City.
Ex. First Asst. Engineer A. S. "Sunlite."

SCHOONER LAUNCHED—BE POWERED LATER

The three-masted schooner "Caroline Frances" was launched on the 11th inst. from the ways of the Barnes & Tibbitts yard at Oakland, Cal. She is built to the order of the Northern Fisheries Co., of Anacortes, Wash., and will be used in fishing and trading among the company's posts. It is planned to install engines in the schooner next year, but at present the owners say they have not made up their minds what type of engine they will use.

Digitized by Google
Original from NEW YORK PUBLIC LIBRARY
Generated on 2024-09-13 08:57 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

The Diesel Engine and Our Merchant Marine

By H. R. SETZ, M. A. S. M. E.

THE article on "Diesel Engine Revolution-Speed and Efficiency" in the December number of Motorship touches upon a subject which calls for the most careful attention on the part of ship builders and marine engineers.

Much has been said and written of late on the question of using Diesel engines for the propulsion of American built vessels. The economic side of this question has been so thoroughly covered that in interested circles there is today hardly any doubt as to the commercial advantages and possibilities of Diesel propelled cargo boats. The well over one hundred first class ocean-going installations furnish convincing proof for the substantial savings in cargo space and weight capacity, fuel consumption, as well as decreased operating crew, and therefore superior earning capacity of a Diesel boat as compared to a steamer of the same displacement. The importance of the superior fuel economy particularly is daily assuming larger proportions.

On the other hand a great deal of uncertainty prevails, principally caused by conflicting, and too often willfully prejudicial, statements as to the broader technical aspect of the marine Diesel engine question. Many of the problems which constitute part of this broad technical question are open to more or less dispute, although the accumulated experience of over ten years distinct marine Diesel engine practice (aside from almost 20 years of stationary application) has cleared up many questionable points. As a result, according to the particular application, Diesel engines are today built in several distinct types which, however, are more and more approaching uniformity in certain distinctive features, irrespective of origin of design or manufacture. Thus we have the submarine engine, the passenger boat or yacht engine, the cargo boat engine, then the auxiliary type, etc., all of which prove two things:

First, that the practical application of the Diesel principle is today sufficiently well understood to permit of as much variation in general structural form as well as materials and methods of manufacture used as in high grade steam engine practice. This is a point worthy of especial mention since in the mind of many, Diesel engines still mean a creation which is possible only in one very particular form which nobody but the select few know how to bring out or to operate. There is of course no such thing as a "cheap" Diesel engine, as are found in other lines of engine work; to the contrary, Diesel engine construction is and will, by its very cycle of operation, always mean precision work, i. e. painstaking care of small details. Beyond this, however, there is today nothing which would distinguish Diesel engines in a general engineering character from other well established prime movers; cautious designers and manufacturers are by virtue of their perfect control over every phase of Diesel engine construction in position to meet every demand within very wide limits.

Second, the Diesel engine is well past the experimental period, and has entered the stage where intelligent design leading toward simplification of detail and refinement in manufacture are the issue. Rather than strive for new forms, responsible designers are availing themselves of the hard-earned experience of the past years. A great portion of this accumulated experience is laid down in the voluminous literature on Diesel engines, although the most valuable part is that which comes from continued personal contact with the various phases of this work, particularly under the greatly varying operating conditions. In the course of some 10 years of intense development work constructive elements of many different forms have been tried under all kinds of conditions; by a natural (although often quite painful) process of elimination this has led to the establishment of certain fundamental facts, the proper interpretation and application of which is what makes the Diesel engine the highly developed specialty it has become today in some two or three American plants, and to a very much larger extent, of course, in Europe. The signal success of the few American concerns who have early heeded the valuable lessons of their European predecessors, both in regards to good design as well as adequate manufacturing facilities, forms a significant contrast to the poor progress that has been made by those who still consider "originality," exemplified by a long list of patents, the chief or only qualification of a successful Diesel engine. If it is remembered that over a period now extending back some 15 years no other branch of engineering has attracted so many people of high technical training and skill, and that as a result of their combined work well informed designers are more and more converging towards common practice, a good deal of caution against all innovations "constructed under the following patents . . . and others pending" seems well justified.

The success of a Diesel engine is determined by three factors which, in the order of their importance are: design, quality of manufacture, and operating conditions. In the broadest technical aspect the dictates of any one of these factors can not be unreservedly met; like any other engineering problem this one resolves itself into a number of compromises between often very conflicting extremes. It is all a matter of constructive skill and personal experience to so weigh these extremes against one another that the final product will show that harmonious adaptation which indicates thorough mastery of the subject. The extent to which this is accomplished is what gives an engine its stamp of individuality, in the form of well-balanced, simple parts, instead of the clumsy features and trappy appendages which are prima facie evidence of the immature reasoning of habitual "inventors" and half-baked designers.

As regards the broadest technical aspect of the marine Diesel engine which calls for compromises in more than one respect there is no more important problem than that of speed. In this case the extremes which enter into consideration are weight and space, economy, continuity of operation, first cost and maintenance. Before entering into an analysis of these different considerations it is well, particularly for Diesel engine designers, to remember that in the ideal application of the Diesel engine to marine work the power is generated and applied directly at the point of use without any intermediary means of transmission; this means that the speed at which the work is to be done also determines the speed at which the engine is to run.

In practically all the other known applications of Diesel engines this is rather the exception than the rule, as for instance in electric power plant work where the generator and motors are in reality nothing else than a means of transforming and transmitting the power generated by the engine in almost any suitable form to meet the final working conditions, irrespective of the engine speed; the latter may therefore be made to vary within the wide limits technically possible with Diesel engines so as to meet various other conditions, particularly such of commercial nature. In marine work the propeller speed decides the engine speed and since this does not permit of any great choice of variation for any particular class of vessels, the speed question at once narrows down to quite a limited range.

On the other hand naval architects and marine engineers should be reminded that the one compelling fact to which concessions can and should be made is the superior economy of the Diesel engine, resulting from its direct method of power generation. Careful study will show that these concessions will in many cases resolve themselves to merely breaking away from certain ideas which are the result of, and apply only to steam practice; in a few isolated cases as much as a slight modification in the hull and propeller design may be desirable. In all cases, however, it will be found that the requirements peculiar to the Diesel engine and those of naval importance can be made to harmonize to such an extent that, all other conditions being alike, the efficiency of the Diesel engine driven propeller will come easily within 1 to 2% of the steam driven equipment under its best condition; this of course leaves an overall margin tremendously in favor of the Diesel engine installation as the following example will show:

Representative figures from best steam engine practice show that of the total heat units contained in the fuel only 11% appear at best as actual shaft h. p., the remainder having been lost in the boiler, condenser, friction and other losses. Assuming the efficiency of a good slow-speed propeller to be 70%, the power finally available to propel the boat will not exceed 8% of the total available energy. The steam turbine has a higher efficiency than the steam engine, but owing to its high speed requires a reduction gear between it and the turbine which offsets at least part of the gain in the steam turbine end, the final result being an overall efficiency which in continued operation rarely exceeds 9% of the total available energy.

In the Diesel engine between 30 and 32% of the energy contained in the fuel appears as shaft h. p. Owing to the preferableness of a somewhat higher Diesel engine speed than what corresponds to the most accepted steam engine practice on merchant marine vessels, it is assumed that the propeller efficiency be only 68%; the overall efficiency of the complete installation will then be from 20½ to 21½%.

At the present high fuel costs this superior fuel economy alone is sufficient to win the cause of the marine Diesel engine, irrespective of the other equally compelling economies referred to in the second paragraph of this article. It shows that, like with the steam turbine, Diesel engines fully justify any concessions or departures, if necessary, from some of the practices that have become associated with steam propulsion.

Compared to other marine installations the power plant of merchant vessels permits of considerable leeway as far as weight and space are concerned. Whereas the technical success of a submarine, for instance, practically depends upon the reduction of the weight and space required by the power plant to the smallest possible minimum, very much at the expense of durability, the very opposite obtains in merchant marine installations. Here the all predominating dictate is durability and reliability; the largest single factor making for these is speed, rotative speed as well as piston speed. It needs no further comment that the lower these speeds the longer will be the life of an engine, but it should be pointed out that extreme consideration of the latter will lead to a monstrosity which, owing to its low speed, would be too heavy, too bulky, too uneconomical and lack the flexibility which marine operation demands.

Early last summer the writer had occasion to discuss with officials of the Emergency Fleet Corporation a plan for the production of marine Diesel engines on a large scale; in the course of these discussions the point was raised that if Diesel engines were considered at all they would have to follow strictly the specifications just then issued for steam equipment. As far as they are vital to Diesel engines these specifications called for the following:

For single screw ships either steam engines of 1400 i. h. p. capacity at a speed of 90 Revs./Min., or steam turbines of 1400 h. p. at the turbine shaft with a reduction gear allowing a maximum propeller shaft speed of 110 Revs./Min. For the twin screw vessels a capacity of 900 i. h. p. at 133 Revs./Min., and 700 i. h. p. at 115 Revs./Min. was specified for each engine, the higher figure representing the highest possible output of the engine at 133 Revs. (live steam in receiver).

The application of the Diesel engine under such conditions forms a most interesting and instructive study which brings out clearly, among other important facts, the relation between engine speed and the points mentioned above. A brief résumé of such a study, based upon what the writer has found to be highly satisfactory practice in continued operation, is given in the attached table.

For the single screw boat both a six-cylinder and an eight-cylinder engine are considered; in the twin screw boat hardly anything else than a six-cylinder engine would be used. Both types of engines for the single screw boat are figured for the three speeds: 90 Revs./Min. to meet the

		Single Screw						Twin Screw	
1.	No. of cylinders	6			8			6	
2.	Revs./Min.	90	110	130	90	110	130	115	150
3.	B. H. P.	1300	1400	1500	1300	1400	1500	700	800
4.	Bore, inches	28	27½	27	25	24¾	24½	21¼	20¾
5.	Stroke, inches	45	41½	39	43	39	36	34	31
6.	Stroke/Bore	1.64	1.51	1.44	1.72	1.57	1.47	1.60	1.49
7.	Piston speed, ft./Min.	675	768	845	645	715	780	652	775
8.	Overall height	23′ 4″	21′ 8″	20′ 5″	22′ 6″	20′ 5″	18′ 9″	17′ 8″	16′ 2″
9.	Overall length	37′ 7″	36′ 9″	36′ 2″	42′ 0″	41′ 6″	41′ 0″	28′ 6″	27′ 9″
10.	Weight, tons	255	235	220	240	230	225	112	105

Generated on 2024-09-13 09:09 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

specified speed of the steam engine, 110 Revs./Min. corresponding to the maximum speed allowed with a steam turbine, and 130 Revs./Min. The engines for the twin screw boat are calculated for a speed of 115 Revs./Min. as specified for the steam engines, and 150 Revs.

The capacities were arrived at by assuming for the steam engines a probable mechanical efficiency of 92%, which for the single screw engine would mean an output of just about 1300 b. h. p.: this therefore determines the capacity the Diesel engines should have at 90 Revs. Making allowance for the probable slight decrease of the propeller efficiency at higher speeds it was assumed that at 110 and 130 Revs./Min. the Diesel engines would have to be capable of developing 1400 and 1500 b. h. p. respectively to give the vessel the same speed. Assuming again a mechanical efficiency of 92% for the twin screw steam engines, their output would be 640 b. h. p. at 115 Revs. and 830 b. h. p. at 133 Revs./Min. In order to maintain this latter output over extended periods of operation it would seem advisable to so proportion the Diesel engines that at 115 Revs. their capacity is 700 b. h. p. (In passing it is well to remember that although this latter capacity is approx. 10% higher than what seems necessary for the propulsion of the boat under the given conditions, this is, from the economical standpoint not objectionable since the fuel consumption of Diesel engines is practically proportional to their output over a very wide range of fractional loads). Making again allowance for a slight deficiency of the propellers at higher speeds, the Diesel engines were calculated for an output of 800 b. h. p. at 150 Revs. On this basis, with mechanical efficiencies and mean effective pressures ranging within the limits dictated by the size of the cylinders, the bores and strokes giving about the best all around ratios at the given speeds figure out as shown on lines 4 and 5 of the table.

It will be observed on first glance that 90 Revs./Min. is too low a speed for either a 6 or 8 cylinder engine of the given capacity. An unusually large bore to stroke ratio had to be chosen to arrive at a somewhat commercial piston speed, 675 and 645 feet/Min. respectively. A much higher piston speed forbids itself for two reasons: (1) the corresponding reduction of cylinder bore which would follow a lengthening of the stroke would not permit to place valves of sufficient free area in the cylinder head; the resulting high intake velocity would, even for the comparatively low ratings common in marine engine practice, reduce the volumetric efficiency below the permissible minimum, with a consequent perceptible falling off of engine capacity; (2) the height of the engine becomes excessive, this being in direct proportion to the length of stroke. Too high an engine structure lacks rigidity, leads to undue vibration and loss of accuracy in alignment, and is more difficult to supervise.

These objections against extreme length of stroke are made in full realization of the advantages which may be claimed for long stroke engines. In fact the writer has long ago learned to recognize these advantages, and has been an early advocate of long strokes in Diesel engine practice wherever applicable. A long stroke, and small cylinder bore, aside from other advantages, means low maximum pressures since it is the bore which determines the maximum load to which the engine parts are subjected. Low maximum pressures will permit of a light engine structure which, if static loads only are considered as is still altogether too common practice here, will not have sufficient rigidity to satisfactorily withstand the vibratory loads and elastic deformations peculiar to marine operation. If designed to withstand these influences, extremely long stroke marine engines are likely to become too heavy and lose a good deal of their accessibility.

Extremely long strokes, relative to the cylinder bore, are therefore not the means, certainly not with the four-cycle type, to make low rotative speeds adaptable to Diesel engines, particularly if it is remembered that the cross head construction, none other coming into consideration for heavy duty marine service, lends itself admirably to higher piston speeds.

As is to be expected, 100 Revs./Min. leads to much better proportions. Owing to the higher rotative speed the piston speed can now, without having to resort to excessively large bore to stroke ratios, be made to correspond with what has become accepted practice. In spite of that and the increased capacity the bore and stroke of both the 6 and 8 cylinder engine become less, with a consequent reduction in height, length and weight.

Where it was not altogether easy to obtain a satisfactory piston speed at 90 Revs./Min., the reverse obtains at 130 Revs., particularly with the 6-cylinder engine where, in spite of the low bore to stroke ratio of only 1.44, the piston speed becomes 845 ft./Min. This is inconveniently high for marine practice, where at times the engine may be called upon to run for considerable periods at forced speeds. Reduction of piston speed by shortening the stroke means a larger bore and smaller bore to stroke ratio. In consequence the engine structure becomes heavier throughout, which means not only more weight, but considerable more expense since many parts will have to be built differently. For instance a short stroke engine requires a solid forged crank shaft whereas a fairly long stroke engine permits the use of a built-up shaft with perfect safety and at a fractional cost of the former. Likewise the connection between cylinder and frame, and frame and base assume proportions which, with too short a stroke, become inconveniently large for the limited space available. The eight-cylinder engine, with a lower piston speed, although larger bore to stroke ratio, is in that respect preferable and is about as well proportioned as the given conditions permit.

From this tabulation the conclusion can be drawn that with a 6-cylinder engine it would be quite practicable to stay within the speed limits specified above for steam equipment, for it is evident that the most favorable speed from the Diesel engine standpoint will be somewhere between 90 and 110 Revs./Min. An engine of 27¾" bore and 42½" stroke, bore to stroke ratio 1.53, would at a speed of 105 Revs. and a piston speed of 744 ft./Min. be about the recommendable size. On the other hand it is equally evident that if other considerations should call for the use of an 8-cylinder engine, a speed in the neighborhood of 120 Revs./Min. would be preferable. Some of these other considerations will be touched upon presently.

Very much the same conclusions can be drawn from the study of speeds for the twin screw boat engines. A speed of 115 Revs./Min. for an output of 700 b. h. p. in 6 cylinders is decidedly low, while the, arbitrarily assumed, speed of 150 Revs. is rather high. An engine of 20¾" bore and 32" stroke would at 135 Revs., 720 feet piston speed with a bore to stroke ratio of 1.51, make a highly efficient unit, well within a speed limit which is perfectly compatible with economical marine propulsion.

The tabulation of the different size engines for single and twin screw boats affords a ready means for comparison of the relative advantages in regards to length, height and weight. As far as economical use of space on the boat is concerned the single unit 6-cylinder engine has the advantage over the 8-cylinder engine by roughly 5 feet, which, being a space gained practically across the whole width of the boat, would mean that much gain in cargo space. The difference in weight, on the other hand, would be slightly in favor of the eight-cylinder engine, which is also true of the height. The greater number of parts, however, would make the 8-cylinder engine both more expensive and also more elaborate to look after in operation.

Comparing these engines with those given for the twin screw equipment, the advantages of the latter in every respect become apparent at once. First, and most important is the gain in length. The auxiliary units which, with the main engines make up the engine room equipment, can easily be placed alongside of the main engines and within their length: the engine room of the twin screw boat would therefore be about 8 feet shorter than that of a single screw boat driven by a 6-cylinder engine, or 13 feet shorter than with an 8-cylinder engine. A saving in height of not less than 4 feet could be accomplished, and the combined weight would also become less than with either a 6 or 8-cylinder single-screw plant. An advantage of inestimable value with the twin screw plant is the practical assurance of power at all times, this not only by virtue of the 2 units of which one can certainly always be kept in running order, but also due to the fact that the cylinders are of a size which, in the light of our present knowledge gained in the manufacture and operation of many hundreds of such, is well within the practical capacity of any well-organized and equipped engine plant. In view of these advantages, although they can not be expressed in terms of dollars, the somewhat higher first cost of the twin screw installation becomes insignificant.

It remains to be seen what other factors are likely to affect the foregoing speed considerations. One very important factor is that of engine efficiency as a power generator, this efficiency being the product of mechanical efficiency and thermal efficiency. The latter again is a function of a number of physical, chemical and thermal phenomena which all succeed and overlap each other in rapid succession. The volumetric efficiency, one of these phenomena, has already been referred to; its importance arises from the fact that the output of a Diesel engine depends upon the weight of air which passes through its cylinders at every stroke. There is a very definite relation between piston speed, and bore to stroke ratio in regards to volumetric efficiency which, especially those will appreciate who have closely studied the torque curve of a Diesel, or other forms of internal combustion engines, applied to transportation problems. Above a certain speed range over which the volumetric efficiency practically remains constant, the latter begins to drop off rapidly, due to the increasing piston speed, but below this speed range of practically constant volumetric efficiency the latter also becomes less as the speed decreases although it is quite evident that piston speed can, if anything, be only of favorable influence in this case. A new element enters here which is caused by radiation of heat from the cylinder walls to the air confined in the cylinder during the suction stroke; the amount of heat thus imparted to the air, resulting in a proportionate reduction of its density, will depend upon the duration of the suction stroke. The slower the speed of the engine the more pronounced will be the interchange of heat. That this becomes a formidable factor at slow speeds was established in a series of extensive variable speed tests, carried out some time ago with unusual care, which showed as high a loss of volumetric efficiency as 6% for a speed reduction of 40%. In a somewhat different way that has come to the writer's attention, suction heating manifested itself on a slow speed engine where a considerable falling off of engine capacity for the same governor position was to a large extent caused by a change in the piston design which brought the air during the suction stroke in contact with a 60% larger, uncooled, piston surface than was formerly the case.

The reverse to suction heating happens towards the end of the compression, and during the whole expansion stroke of slow-speed engines; heat to an increasing amount is abstracted from the working medium in the cylinder through the cylinder walls to the cooling water as the rotative speed of the engine becomes less. Although the heat thus abstracted means a direct thermal loss, this is not as important on Diesel engines as the resulting reduction of compression temperature, and the stresses set up in the cylinder walls. It can be readily understood that the slower the engine speed the higher will be the extreme temperature fluctuations on the innermost layers of the cylinder walls, and the deeper will these fluctuations penetrate into the interior of the walls. With the outside layer of these walls, wetted by the cooling water, at practically a constant temperature, the fluctuations on the inside produce tension and compression stresses which become dangerous if the lowest temperature drops much below the mean temperature of the walls; the resulting tensional stresses are higher than what is permissible with cast materials. This is the initial cause for the small surface cracks which, augmented by other causes which do not interest here, are bound to grow and ultimately require replacement of the particular piece. The occurrence of such cracks can be forestalled to a great extent by extreme skill, but in slow speed engines they are always more likely to occur than at higher speeds.

The reduction of compression temperature, resulting from slow speed, is a matter of particular importance with marine engines. In the operation of vessels it is no infrequent occurrence that their engines may for hours in succession have to run at reduced speeds, as low as ⅓ the normal speed, at which the engine must still be able to turn over safely. This is not possible with a Diesel engine unless the compression temperature is high enough to ensure ignition of every fuel charge injected into the cylinder. In engines of a low initial speed conditions may quite easily arise where at reduced speeds this will not happen, as the following case of early marine engine experience will show with which the writer was connected: On the engine in question, a 6-cylinder 4-cycle unit, provisions were made to adjust the lift and timing of the fuel injection valve within a wide limit while in operation so as to determine the lowest speed at which engine could be run. On the first trials ignition became irregular and spontaneous if engine was run for any length of time near ⅓ normal speed. For other reasons it became desirable to raise the compression pressure from 460 to 495 lbs./sq. in., which proved of distinct benefit in the slow running of the engine. Recognizing the significance of this, an automatic control for the cooling system was then worked

Generated on 2024-09-13 08:57 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
NEW YORK PUBLIC LIBRARY

out whereby less water was circulated as the engine speed was reduced; with this it finally became possible to reduce the engine speed to just ¼ the normal Revs. with perfectly satisfactory regularity in extended operation. With higher speed engines the same can be accomplished without having to resort to any such special provisions. This becomes a matter of especial importance nowadays where fuels of such low grade have to be burnt in Diesel engines; maintenance of high compression temperatures under all conditions is doubly necessary here to insure complete and quick combustion. Stated in other words this means that the important requirement of flexibility, i. e., highest possible ratio between normal and lowest speed, points towards initially higher engine speeds.

Another most important factor which enters into the speed consideration of marine engines is the injection air compressor, which is now universally driven from the main engine. On engines of low rotative speed the bore to stroke ratios become altogether too unfavorable for a satisfactory piston speed and highest possible efficiency. In the high pressure stage particularly the piston diameter becomes so small (unless it be an engine of very large capacity) that it is impossible to arrange for suitable valves without excessive clearance volume and rather unsatisfactory construction throughout. If on the other hand the stroke is shortened, in an attempt to overcome these difficulties, the low pressure cylinder assumes unwieldly proportions which again leads to excessive losses. It is for this reason that on a number of large engines the injection air compressor consists of 2 units: a low pressure and the intermediate pressure stage in one, and the high pressure with a low pressure stage in the other unit. A comparatively small increase in rotative speed helps admirably towards the simpler and more satisfactory solution of this problem in one compressor unit.

This qualitative analysis could be extended by a number of additional, almost equally important arguments, all pointing towards relatively higher Diesel engine speeds, compared to current marine steam engine practice. Thus in the above example of single screw boat the 8-cylinder engine would, considering everything, in this particular case undoubtedly be preferable over the 6-cylinder unit for no other reason except its more favorable speed. Considering, however, that even with ample additional engine capacity provided for a probable falling off of propeller efficiency with increased speed the engine can be made smaller in every direction and lighter, the full measure of these advantages, as was also shown above, is had by resorting to twin-screw equipment.

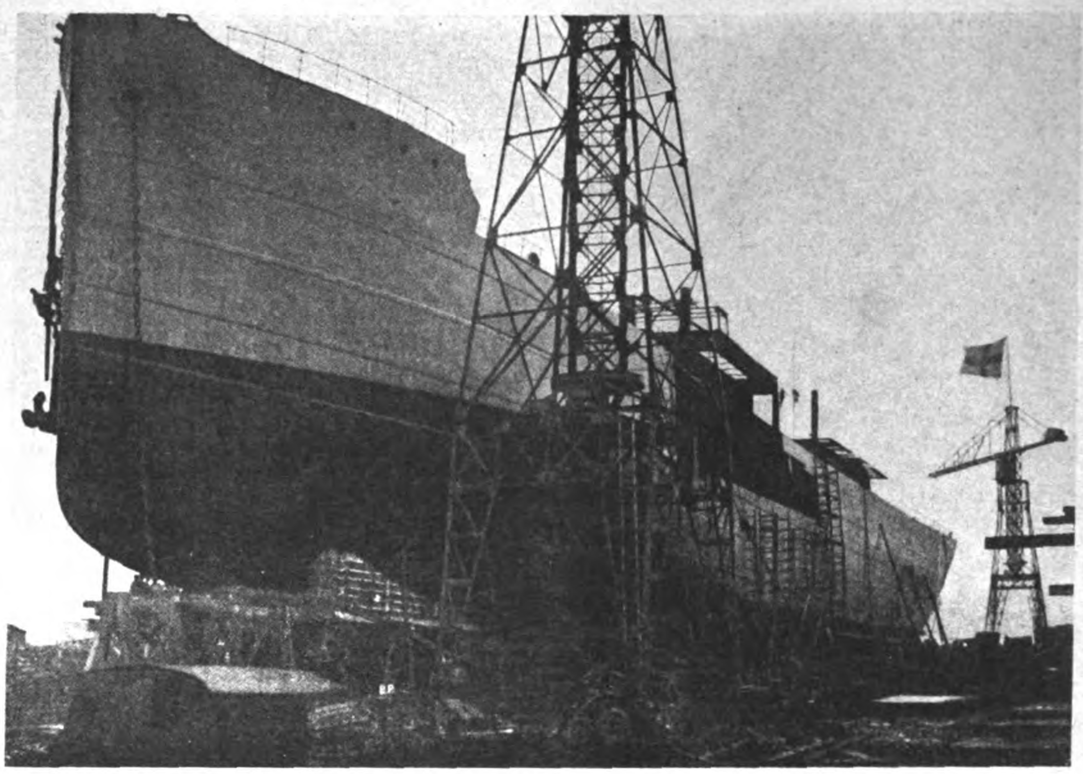
In an early issue of Motorship the writer expects to go into a more quantitative analysis of marine Diesel engines by way of giving particulars on a type with which American readers are not yet acquainted, although it has proven highly successful in operation as well as from the manufacturing viewpoint. Without possessing features of a startlingly new character, this particular type is constructed along lines which only judicious consideration of intimate Diesel engine experience and marine requirements could endorse; the result is an engine of admirable simplicity and adaptability to conditions such as we have to meet here.

These foregoing remarks apply to marine Diesel engines for direct drive only, which is beyond any question the most ideal arrangement, particularly since the problem of reversibility has now been solved, and proven to be entirely satisfactory under all kinds of operating conditions, in a number of different forms. Marine Diesel engine installations are of course also possible in the form of indirect drives, by means of reduction gears or electric transmission; the latter especially opens possibilities which for certain conditions are most promising to contemplate upon, although here is not the place to do so. Whatever method of indirect drive is used, it will permit of considerably higher engine speeds than what is feasible with direct drive on merchant ships, with a corresponding material reduction of space and weight required for the complete power equipment.

It is to be hoped that the broad technical aspect of the marine Diesel engine, considered from viewpoints such as those enumerated above, will be exhaustively studied by those who contemplate including such work in their future activities. Much of the success of Diesel engines in our future merchant marine, which under the pressure of foreign competition already fully realizing their advantages will be forced to adopt them on the same extensive scale, will depend on the thoroughness with which the preliminary steps leading to the final adoption of any particular form are undertaken. Considering the fact that the bulk of vessels in the carrying trade are of a size for which Diesel engines are the ideal power and will in the very near future predominate, it is well worth while to prepare for this activity early and with more deliberation than what has been true in some notable recent cases.

Sweden's Largest Ship—A Motorship

THE motorship "Bullaren" was launched recently at the yard of the Goteberg Nya Verkstad, Gothenburg, Sweden. She is the first of three sister ships to be built for the Transatlantic Company and is the largest ship ever built in Sweden, having a dead weight carrying capacity of 9100 tons. The builders established a record in the construction of this ship, completing her in three months. The keel of the "Bullaren" was laid in September, 1917. Her dimensions are as follows: Length over all, 440 ft.; length between perpendiculars, 425 ft.; beam, 56 ft.; depth to the top of the shelter deck, 38 ft.; full cargo draft, 26 ft. The ship has three decks and a shelter deck, five large cargo holds and six hatches. She is fitted throughout her entire length with double bottoms so arranged as to carry water ballast and fuel oil. Several tanks for fuel oil have been fitted alongside the tunnels.



MOTORSHIP "BULLAREN"

The "Bullaren" is built with a cruiser stern, has three masts and will be equipped with electric winches of the Sieurins type (ten of these will have a capacity for three tons and two for five tons). The windlass, steering engine and all other auxiliaries will be electrically driven by means of three generators directly connected to Diesel motors. For heating purposes a small donkey boiler will be installed. The main propelling machinery consists of two 2000 i. h. p. four-cycle type Diesel motors of the Burmeister & Wain design. The engines were constructed in Sweden, however, under license by the Gothenburg works, and are the first to be built in Sweden.

As will be gathered from the dimensions and power of this vessel, she is exactly similar to many vessels built by Burmeister & Wain at Copenhagen for the East Asiatic Company and other firms of neutral shipowners.

RIVER MOTORSHIPS FOR PASSENGERS.

The development of river transportation in California by means of motor-driven vessels took an important stride forward this month by the action of the Inland Transportation Co., of Stockton in ordering ten motor vessels to be built immediately in the shipyards of Stephens Bros. of that city.

The new vessels are designed especially for carrying passengers on the San Joaquin river, although some express matter and light freight will also be handled. Each boat is 62x14, with a light draft to carry them over the shallow places in the river. Twin 92 h. p. six-cylinder Wisconsin engines will operate on twin screws and it is expected that a speed of not less than 18 miles will be maintained at all times with a maximum of 22 miles.

The first of these new vessels is already under construction and will be ready for operation within ninety days. The others will follow along at intervals of two weeks until the whole ten are in service. The management are of the opinion that these boats will prove extremely popular and it has contracted with the builders to duplicate the order immediately at the conclusion of the tenth boat, in case that the company's expectations are fulfilled.

All the parts of these vessels have been standardized and are interchangeable. It was by this method that the low contract price, $130,000 for the ten, was made possible. Each boat has a capacity for 100 passengers, and provides cabin space for all. A special cabin is set apart for women traveling alone, and another for smokers. A majority of the people are expected to patronize the main cabin.

While these boats are constructed for use on the San Joaquin river, they will run through parts of the Sacramento delta, in an effort to divert the trade of the people living there to Stockton. It is expected that this means of travel will prove attractive to tourists, who at present can see very little of the scenery along the California rivers.

MARINE DIESEL ENGINES REQUIRED.

Will American Diesel engine builders who can rapidly deliver this class of machinery please send complete details to M. C. Zulver, marine-superintendent, Anglo-Saxon Petroleum Company, Ltd., St. Helen's Court, Gt. St. Helens, London, E. C. 3, England. They are in the market for the same, with the view to installing the same in all sailing ships which they recently have purchased.

THE HORROR OF DARKNESS.

Capt. Wm. Johnson of the torpedoed steamship "Actacon" reports that two minutes after the deadly missile struck the ship, water reached the engine room and all lights went out and the boats had to be launched in darkness. When will the authorities insist that every merchant vessel be equipped with motor-driven emergency electric lighting sets on deck?

Generated on 2024-09-13 08:59 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

Some Trouble With Reversing Gasoline Engines

A Few Effective Hints About Handling Them

By GEORGE NICHOLSON, C. M. M. U. S. N. R.

WHEN a man gets a job handling an air-starting and reversing gasoline engine he is very much at sea for though he be a man thoroughly conversant with gas engines fitted with reversing clutches he will find that an engine of this type has many concealed tricks which he will find out only through experience. The writer has experienced some of those from his experiences aboard a vessel equipped with this mechanism. The type of engine that he has been running is the six-cylinder, 220 h. p. Standard engine as installed in the large U-boat chasers built for the United States Navy. They are fitted with break ignition and a constant level vaporizer, fitted with a series of jets or nozzles of various sizes. Over the top of the vaporizer there is a cylinder. In this cylinder a piston moves up and down. This piston is connected with a plunger which is connected in turn with a sliding shutter which covers and uncovers the nozzles and air-intakes according to the speed desired. The cylinder is connected with the body of the vaporizer by a tube which causes a vacuum in the cylinder which makes the piston rise and fall according to the position of the throttle, thus automatically giving more gas or air. Sometimes when the nozzles are more or less dirty a fine wire can be run through them by removing the shutter. The engine backfires when the nozzles are dirty thus this trouble is easily ascertained. If back-firing should start it can easily be stopped by putting more weights on the piston rods of the vacuum chamber piston. Sometimes when starting up the engine cold the engine will backfire, this of course is not due to dirt but to the cold air and gas and can be remedied by bearing down a trifle on the shutter, thus drawing in more gas. When the engine gets warmed up a trifle release the shutter. A peculiar thing about this type of engine is that in cold weather it will be found practically impossible to start directly on gasoline unless it is of very high gravity, for when the starting air valve is opened the starting air is expanded in the cylinder undergoing a drop in temperature which has a chilling effect upon the gas. Ether must then be mixed half and half with gasoline to prime the cylinders and to open the starting air valve, at the same time the weights on the vaporizer must be held down a trifle. A few explosions will heat up the inside walls and the engines should be run about five minutes before any attempts be made to maneuver. The boat should under no consideration be started out on a cold engine. Another thing to be watched is the performance of the air starting valves which sometimes stay open—this can be remedied by rotating them with a stillson and by putting some kerosene on the stems. Air check valves will sometimes stay open but by the same method—putting kerosene on these occasionally—this trouble will be overcome. This last must be watched very closely because it may not be noticed until the engine is stopped. Then when maneuvering is attempted if the cranks are in a certain position the engine will not start. The water cooled exhaust valves must be removed occasionally and be taken apart and cleaned as a deposit of salt collects in them and they will burn if not cleaned. In very cold weather the ignitor rods are apt to break when starting up unless the engine room is heated; this is due in all probability to the chilling of the metal. As to ignition it is absolutely essential that the wiring be so arranged that the magneto and other sources of current cannot be "on" at the same time. If this should happen the magneto becomes rapidly demagnetized. It is found better to divide the ignitors into two groups of three and to use a separate coil for each group. The battery used is the regular storage lighting set cut down to six volts by means of resistance. The ignitors are apparently the weak spot on the engine and it is always well to have a half dozen on hand at all times. The main difficulty with the ignitor is that it develops a leak around the fixed electrode which forms a gaseous film around it and prevents the conduction of heat to the main body of the ignitor and therefore to the cylinder head. This results in the overheating of the ignitor points thus causing pre-ignition. This is frequently not noticeable by sound but nevertheless causes a loss of from 3 to 4 h. p. in the engine. While the engine is on the test bed if a drop should show on the beam scale the first place to look for trouble is the ignitor point. In fact the badge of office may be said to be a little piece of tubing which is used for opening the priming cocks on the cylinders. By using this and by holding the ignitor mechanism so that it cannot operate if self-ignition is present, the cylinder will keep on firing. If this process is kept up a sufficient length of time the ignition becomes so early that the characteristic pre-ignition knock becomes noticeable, and upon removing the ignitor the points will be found to be seriously burned.

Next to the ignition difficulty, the greatest difficulty will be the overheating of the cylinders resulting in the warming up of the inlet water. Some difficulty has been found with the top of the jacket space which may become considerably hotter than the outlet temperature of the jacket water. This trouble will be found to be due in part to a lug projecting in the water jacket space, which forms on many cylinders a bridge which prevents a proper circulation of water to the top of the cylinders. This bridge arose from the improper spacing of the core for the water jacket. These had to be removed by chipping in the test house of the engine builders. Sometimes this chipping out remedied this and other times it did not. The water enters the cylinder jacket at the bottom on one side and leaves from the top on the other side. The jacket space being very liberal in size it allowed a very low water velocity within it and the path of the water was a diagonal one from the point of the inlet to the outlet. As a result of this the water will stagnate at the top of the jacket on the inlet side and it gradually becomes hotter and hotter. By feeling the top from time to time it will be noticed that the amount of stagnant water steadily grows. At the point of entrance of the water to the jacket there is a baffle which deflects the water downwards, the idea being that the downward stream will strike the bottom of the jacket and be deflected uniformly around the cylinder and the warm water will thus rise to the top. By using the inlet arrangement so baffled a stream of water was directed upward reaching the head and driving out the stagnant zone. In many cases this last arrangement has completely solved the problem.

Another difficulty which may occur is in the hanging up of the air-starting valve. In one special case the holes through which the stems of these valves pass have been reamed .004" larger than normal. If unlimited air is available there is no reason why a fairly large clearance between the stem and the guide should not be employed. The best method to get these loose in a hurry is to give them a liberal dose of kerosene or gasoline along the stem, at the same time they should be twisted with a wrench on the hexagonal nut on the bottom of the stem. The more thorough way is to take out the so-called automatic air-check on the side of the cylinder and to inject kerosene through the opening so formed. Occasionally, although it is very rare one of these automatic checks will leak slightly which is soon noticeable by the overheating of the air-pipe along the tops of the cylinders due to the blowing back of the gases at the time of ignition. If the leak is very small it will probably be never noticed, but if it is appreciable it will melt the solder on the joints of the air-line. No difficulty has been encountered in pumping air to 200 on test, although it takes some time to do it. There are some reports from the yard where the compressors are used continually that the delivery valves become leaky. What is the reason for this it has not yet been determined, but on the test the compressors are run only long enough to pump up to 250 lbs. The writer cannot understand the high temperatures that arise from the single stage compression of air up to 250 or 300 lbs. The engines are run with a liberal amount of oil—about one gallon to 300 horsepower hours.

There is a valve on the outlet water manifold by means of which the proportion of water passing through the cylinder jackets and heads may be regulated. The best results are found in running the heads fairly hot and using as much water as possible in the cylinders, although it is not thought to be necessary on account of the baffling trouble mentioned before. When the exhaust valve or the cooling portion of it is taken out it must be made sure that the little central tube is put back with the arrow on the top of the stem pointing outwards, otherwise it will cause a steam pocket in the valve. It will be found to be good practice to remove the ignitor plug frequently otherwise they become so tight, due to carbon deposit, that it becomes necessary to remove the cylinder heads to get them out.

If the engines are run at less than rated load it is well to run with a late spark as the engines run more smoothly when the spark is not advanced to the point where maximum power and economy are obtained. When the engines are tested in the pit the air screen is removed from the vaporizer. The purpose of this is to note the effect of the clogging of the tubes and on a supplementary test to determine what would happen to the power and fuel consumption should this screen be put on. The vacuum formed with the screen is greater than the vacuum without it and the mixture is more nearly correct. The results of the test showed that the horsepower and fuel increased. This is slightly above contract requirements, but it is possible to get back to it by closing the throttle four notches after which the horsepower was the same as in the first place. On the throttle quadrant is the word "full" and an arrow pointing to a certain notch. This does not mean that the throttle is wide open at this point but means that it is the position at which the full contract load of 220 h. p. at 460 r. p. m. was realized. With the screen on the vaporizer the engine did better than 220 h. p. without changing the throttle and the speed will probably be above 460. The engines will operate safely at 500 r. p. m. but it is not advisable to go above that speed, although on tests they have been run as high as 520 r. p. m. The contract requirements are 220 h. p. at 460 r. p. m., 160 h. p. at 345 r. p. m., and 60 h. p. at 260 r. p. m.

NEW FRENCH AUXILIARY SCHOONER MAKES GOOD TIME ON FIRST LAP OF MAIDEN VOYAGE.

Recording an average speed of seven knots per hour under her auxiliary power, the new motor schooner Ypres, which sailed from Seattle and made a fine run to Port Angeles, according to Capt. C. W. Call, who acted as pilot of the new ship as far as Port Angeles.

Capt. Call returned to Seattle singing the praises of the new ship, which, he maintains, is the finest of all of the vessels so far turned out by the Puget Sound Bridge & Dredging company for the Washington Shipping Corporation and built for foreign interests.

The Ypres is the fourth of six such vessels being built for the French, and is commanded by Capt. S. B. Shaw, a well known North Pacific navigator. Her chief engineer is J. Quinn, a brother of Capt. Thomas Quinn, the latter a well-known navigator of Alaskan waters. The destination of the new schooner is withheld in accordance with censorship regulations. She was loaded in Seattle and Tacoma by Thorndyke & Trenholme, Seattle agents for the owners of the vessel.

ENGINES ARE ORDERED FOR ANDERSON VESSELS.

Having laid the keels and placed the frames for the two 3,000-ton motorships being constructed at his Lake Washington wooden shipyard, Capt. J. L. Anderson, president of the Anderson Shipbuilding Company, and a pioneer shipping man of Seattle's inland waterway, recently placed an order with Ross & Winter, the Seattle agents, for four 500-horse power Skandia engines which will furnish the motive power of the new vessels.

SKIPPER ENTHUSES OVER THE PACIFIC BUILT MOTORSHIP "MAGRUDADA"

Capt. Frederick Rouse, in a communication from Arica, Chile, dated January 7, writes, that he is discharging cargo at that port, after which he will load nitrate for Georgetown, Demarara, and from there he hopes to be ordered to God's country, which means any part of the United States bordering on the sea coast. Our readers, continues the New York "Marine Journal," will remember Capt. Rouse sailed from Seattle some time ago in the four-mast auxiliary schooner "Madrugada," and in the last paragraph of his interesting letter has this to say of his vessel:

"This is some ship, I can assure you. But I suppose these motor schooners are in their infancy, and will improve like every vessel that first comes on the market—whether it be ship, concrete barge or fast power yachts."

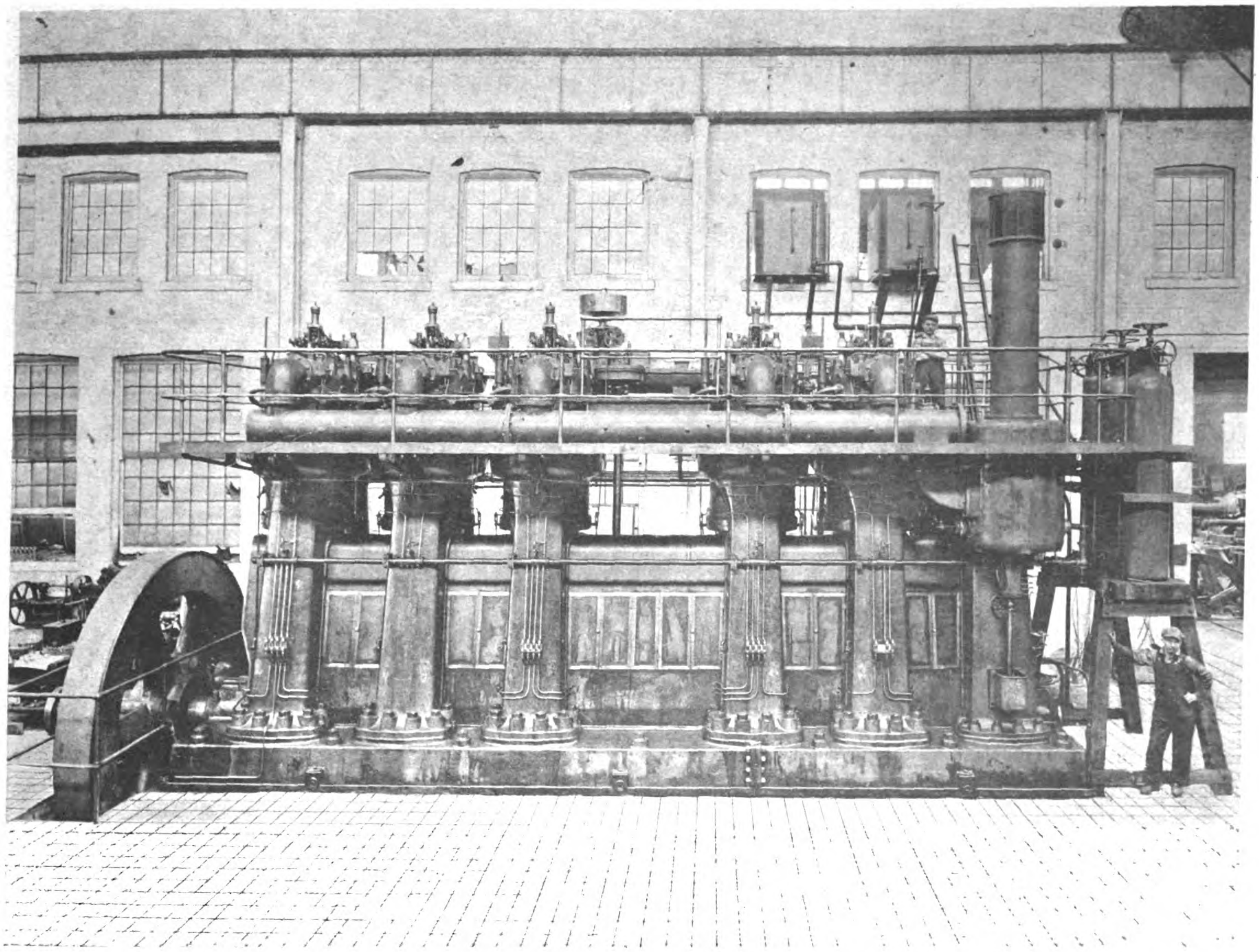
Generated on 2024-09-13 09:04 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

The Nordberg-Carels Diesel Engine

AMONG American engineering works, likely to become prominent at no distant date as builders of heavy-duty, high-powered, marine crude-oil internal-combustion-engines, is the Nordberg Manufacturing Company of Milwaukee, Wis., whose plant we recently visited, and which certainly is one of the largest and most complete heavy-duty Diesel engine construction works in the United States, and already five 1250 b. h. p. (equivalent to about 1500 steam i. h. p.) Diesel engines have been completed by them, although for land purposes. But, as they also are marine steam-engine builders their forthcoming entrance into the marine field should be successful from the start, and we came away from their works very much impressed, although as our readers know we are fairly discriminating and exacting in our standard of requirements for the construction of marine Diesel engines.

About four years ago arrangements were concluded by Nordberg's with Carels Freres of Ghent, Belgium, for the building of their Diesel-type engines in the United States. It was their original intention to manufacture these engines exactly as they were being built in Europe. On account of the war interfering with the free and rapid exchange of correspondence and machine parts. Nordbergs were compelled to build the engines entirely in this country.

This gave them an opportunity to make a number of improvements on the European engine so that as built here, while essentially the same design, there are a number of improvements incorporated. These engines are of the vertical, two-cycle type with three, four, and five power-cylinders and one scavenging-cylinder. The five-cylinder engine develops 1250 b. h. p. at 180 r. p. m. and is the largest stationary Diesel-type oil-engine built in the United States.



THE 1250 B. H. P. NORDBERG DIESEL ENGINE. IN MANY RESPECTS THIS ENGINE RESEMBLES THE CARELS MARINE-TYPE DIESEL ENGINE. NOTE THE COMPARATIVE SIZE OF THE MAN ON THE UPPER PLATFORM

One of the principal features of these engines, says Mr. B. V. Nordberg, the president, is the crosshead. Many American builders of Diesel engines do not use a crosshead, but depend upon the piston to act in this capacity. Practice has shown that crossheads are necessary in a well-designed steam-engine, and through an investigation of the forces acting in a Diesel engine they found that a crosshead is more necessary in this type of power machine. In fact, the crosshead guides are water-jacketed. The cylinder-heads, crosshead-guides, and exhaust-pipes are all water jacketed. On account of the high temperatures in the cylinder, all parts of the engine which this heat can get to are water jacketed in order to increase the comfort of the engineer-in-charge.

The first engine which they built, after being installed, was given a continuous run of 45 days (or 680 hours) under practically full load, and subsequent engines showed practically as good performance. At the time the present war started there were over 80 engines of this type in successful operation in Europe and Asia. These latter engines, of course, were built by Carels Freres. The Nordberg Company are now working on an order of 15 large Diesel-type engines, some of which have already been shipped and are in operation. These engines are being used for generating current and for driving air-compressors. They also have a large number of 1400 h. p. marine steam engines under construction.

Cutting & Washington Appoints Pacific Coast Representative.

Cutting & Washington, the well established firm of Radio Engineers and Manufacturers of Cambridge, Mass., have recently appointed P. E Wallace their Pacific Coast representative. Mr. Wallace is a radio engineer of more than ten years experience in designing, manufacturing, installing and operating radio apparatus both for the Government and for commercial groups.

This company has received the contract to supply 40 ships which are being built for the French Government by the Foundation Company at their yards in Portland, Ore., and Tacoma, Wash. Mr. Wallace will superintend the installation aboard these ships. His headquarters will be at 307 First Avenue South, Seattle, Wash.

A 2,400 B. H. P. SUBMARINE DIESEL ENGINE.

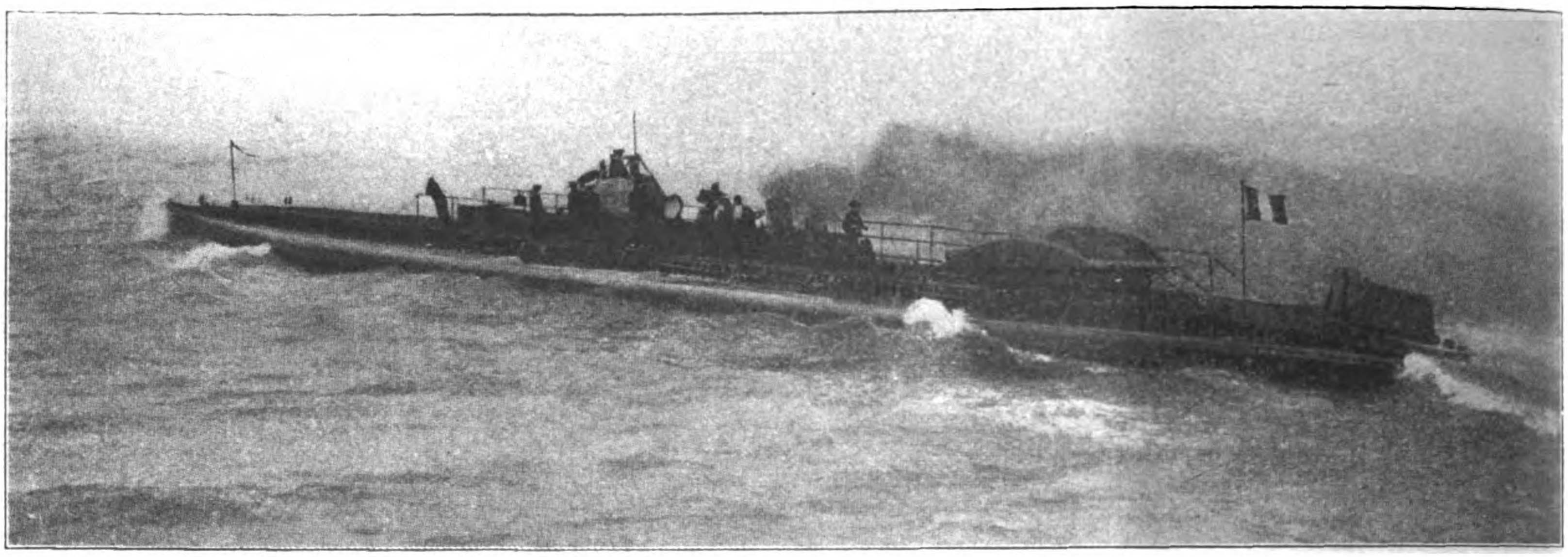
An important firm of French engineers recently has been advertising in this journal submarine Diesel-type engines of 2,400 b. h. p. per shaft (or 4,800 b. h. p. for a twin-screw boat). A pair of such engines were built by them for the 800-ton French submarine "Néréide." These motors are of the two-cycle, single-acting type, each having eight cylinders with a stroke of 17.5", turning at 350 r. p. m. and developing 2,400 b. h. p. on a weight of just under 60 tons, or 56 lbs. per brake-horsepower. Three such motors in a 900-ton torpedo-boat destroyer would mean 7,200 b. h. p. (equivalent to about 8,000 steam i. h. p.) on a total machinery weight, including auxiliaries, of about 160 tons, and so would produce a speed of 24 to 25 knots if the destroyer was equipped with a couple of 5" guns. What a splendid type of sea-going submarine patrol a fleet of such craft would make! Building of such craft, if placed in proper hands, would be no risky experiment.

MOTORSHIP CONSTRUCTION IN SCANDINAVIA.

At Gothenberg, eight large steel-built full-powered motorships are under construction, all of which will have Burmeister & Wain four-cycle Diesel engines installed. Two of these vessels are of 9,100 tons d. w. c. It will also be remembered that Mr. Fred Olsen, of Christiania, has ordered six large Diesel-driven freighters, three from Burmeister & Wain of Copenhagen, Denmark, and three from Werkspoor of Amsterdam, Holland. The construction of these fourteen (14) large motorships indicate that Swedish and Norwegian shipowners are fully alive as to the importance of the marine oil-engined vessel.

Generated on 2024-09-13 08:59 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

French Submarines—From Steam to Diesel



FRANCE ABANDONED STEAM MACHINERY FOR SUBMARINE PROPULSION IN FAVOR OF DIESEL POWER. NOW SHE USES DIESEL-DRIVEN SURFACE VESSELS TO PATROL FOR GERMAN DIESEL-DRIVEN SUBMARINES. THE ILLUSTRATION IS OF A LARGE FRENCH DIESEL-DRIVEN SUBMARINE. NOTE THE SMOKE FROM THE OIL-FIRED BOILER, WHICH BETRAYS HER PRESENCE MANY MILES AWAY

WHEN France increased the size of her submarines she turned from internal combustion motors to steam engines and boilers, and later abandoned steam machinery for Diesel power. Now she possesses some of the largest and highest powered oil-engined submarines in the world. The illustration which we give is of the French Laubeuf designed submersible "Papin," which was completed in 1908 by Schneider et Cie and was a large craft for those days.

The "Papin" is 165 feet long, by 16 feet 3 inches beam and has a submerged displacement of 550 tons, and a surface displacement of 400 tons. In 1909 she made a trip from Cherbourg to Bizerte, Africa, a distance of 1800 nautical miles, in 14 days, only calling at Rochefort, Oran and Algiers. It is interesting to note, however, that after conclusive and exhaustive trials with a number of steam-driven submarines, the French Navy was obliged to turn to the Diesel oil-engine and the results have been most satisfactory. All French submarines since the "Circe" class in 1907 have been Diesel driven. The "Circe" was of 490 tons submerged displacement, and had a cruising radius of 1,800 miles.

OIL FROM BROWN-COAL USED FOR GERMAN U-BOAT FUEL.

AT the present time Germany is using tar-oil as fuel for many of her submarines, and it is valuably interesting to know how she obtains this oil from brown coal, which, of course, is of little or no use under boilers. During the war such technical improvements have been made in the manner of utilizing coal that it will mean a saving of millions by future generations. The German brown-coal industry (lignite) has had the particular attention of Teutonic financiers. Large purchases of brown-coal fields were made and fantastic prices paid for the right of working the same. Dr. Edward Graefe has written an interesting paper in Germany on the causes of this financial activity. The chief causes lie in the fact that ways and means have been found to manufacture numerous and valuable side products from brown-coal to such an extent that their value alone covers the cost of the combustible.

To utilize coal solely and entirely for the purpose of generating power, he says, is highway robbery. The future with its ever-increasing industrial demands can no longer afford such luxury. It demands that a truly economic use be made of the treasures laid up for us centuries ago by the sun. To obtain power together with valuable side-products—this is the requirement today for the brown-coal industry as for all others, and the progress that has been made in this direction, by means of new methods of gasification has made it possible to live up to these requirements. Installations have been planned in Germany and some even started, which will allow of one million tons of raw coal being gasified yearly. This gasification is brought about by throwing coal into the generators, which are iron cased and walled in furnaces, where it is burnt with injected compressed-air. In this manner the greater part of the coal is transformed into generator gas, which contains the chief caloric contents of the coal and which is used for generating power. About two-thirds of the nitrogen is transformed into ammonia, which is washed out of the gas by means of acids and the sulphur escapes in the shape of sulphur hydrogen, which is transformed into pure sulphur by a special process.

From the million tons of brown coal the following products are obtained:

About 60,000 tons brown-coal tar.
About 10,000 tons sulphate of ammonia.
About 20,000 tons pure sulphate, which will be used in part at once to produce the sulphate of ammonia.

The value of these products is estimated at between $2,000,000 and $2,250,000. In burning the generator gas sufficient useful calories can be obtained to produce a motive power equal to forty or fifty thousand h. p.

Each one of these by-products has been most valuable in the German industrial world and render industry practically independent of foreign countries. The brown-coal tar for instance is the foundation from which lighting-oil, liquid-fuel for driving Diesel engines (the source of power of the U-boats as previously mentioned) and paraffine are obtained, quite apart from other by-products, which might be obtained by application of further processes to the tar itself.

The sulphuric acid ammonia is a very good fertilizer for agricultural purposes and the sulphur is a great boom to the chemical industry, especially as it is entirely free from arsenic. The well-populated towns lying in the neighborhood of the brown-coal districts insure an immediate outlet for the electric power generated, especially if Diesel engine-generated, inasmuch as this power will not have already been entirely used up by industrial settlements. Such settlements can be expected on the part of the electro-chemical and electro-metallurgical industries because of the attraction of the presence of large quantities of raw material in the neighborhood of brown-coal fields.

WOODEN MOTORSHIPS UNDER CONSTRUCTION IN AMERICA.

(Official Figures.)

According to the evidence of Admiral Francis T. Bowles of the U. S. Shipping Board Emergency Fleet Corp., before the Committee on Commerce of the U. S. Senate on Dec. 22nd, 1917, there were at that time under construction in the United States no fewer than 77 wooden auxiliary and full-powered motorvessels of under 2,500 tons d. w. c. aggregating 117,650 tons d. w. c. That gives an average of 1,520 tons per ship. This list apparently does not include several wooden motorships of over 2,500 tons d. w. c. and a large number of small commercial motor craft.

THE BIG GERMAN SUBMARINES.

One of the passengers on the S. S. "Nieuw Amsterdam," which arrived from Holland on Feb. 6th, stated that Germany was getting ready for intensive submarine warfare in March, and was building a fleet of 2,000-ton submarines and will mount two 5.9-inch guns, which will enable them to fight torpedo-boats and submarine-chasers. Twelve to eighteen submarines are maintained in service in the zone at one time, but that this number will be increased. The construction of the small submarines that were sent overland through Belgium has been discontinued.

This report, it will be noticed, is very consistent with what Motorship has been saying for several months past.

MOTORSHIP "ALLARD" ON HONOLULU RUN.

The motorship "S. I. Allard," one of the vessels belonging to Charles R. McCormick & Co., which has been taken over by the Shipping Board and operated by the Matson Navigation Co., recently made the run from the islands in less than ten days. A few years ago this would have been considered excellent time for the largest steamers afloat on the Pacific.

WANTED.
Schooner from 75 to 150 tons. Sail or auxiliary.
1015 Alaska Bldg., Seattle, Wn.

Available for IMMEDIATE DELIVERY
240 H. P. HEAVY-DUTY
MARINE OIL ENGINES
OF STANDARD MAKE
JOHN H. BERNHARD, 52 Broadway, New York

Christoffer Hannevig, Inc.
CHRISTOFFER HANNEVIG, President
Representing
Christoffer Hannevig, A/S
Christiania, Norway
The Pusey & Jones Company
Wilmington Plant, Wilmington, Del.
Pennsylvania Plant, Gloucester, N. J.
New Jersey Plant, Gloucester, N. J.
Newfoundland Shipbuilding Co., Ltd.
Harbor Grace, N. F.
Dominion Shipbuilding Co., Ltd.
Toronto, Ont.
Thor Iron Works, Ltd.
Toronto, Ont.
Baltimore & South America Navigation Co.
Baltimore, Md.
Brokers for the Chartering, Sale and Purchase of Steam, Motor and Sailing Vessels
For further particulars apply
CHRISTOFFER HANNEVIG, INC.
139 BROADWAY NEW YORK CITY

Generated on 2024-09-13 09:03 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

M. A. "GUANACOSTA."

THE following letter from a member of the crew of the "Guanacosta" one of the motor auxiliaries built at the yards of the Columbia Engineering Company of Portland, Oregon, speaks well for the construction of these vessels. The "Guanacosta" is built to the same designs as the "Ethel" which is illustrated on the cover of this issue of Motorship. She is equipped with 400 b. h. p. Craig Diesel engines and has already seen some very hard service. She went through the same storm which caused the damage to the M. A. "Astri" without any damage to speak of to the "Guanacosta." Later she went through a very severe storm while loaded to within 11 inches of her deck with ore and was forced to run ashore, tearing off part of her keel, but no permanent damage was done to the vessel.

Mr. Graham is the son of Capt. Graham, owner and operator of the Oregon City Transportation Company, which operates a line of river steamers on the Willamette River, Oregon. His letter is as follows:

"Norfolk, Jan. 11, 1918.

"Editor Motorship:

"Docked here yesterday afternoon and payed off this morning. Well, we had some little trip up from Key West. We got within sixty miles of Norfolk once and then ran into a blizzard coming from dead ahead. We hung on all night under double reefs and then our foresail carried away and the jib went a little later and we had to turn and run before it. Got blown two hundred and fifty miles away before it let up.

"The wind against the three knot current of the Gulf Stream kicked up a terrible sea and we had oil bags strung along fore and aft. The seas looked like mountains, just like you read about in story books. I have never seen anything like it before and didn't imagine it could blow so hard. It was a wonderful sight, but only an optimist could appreciate it. We had two men at the wheel all the time and every time I would look behind me while at the wheel the cold shivers would run down my back. She is a beautiful sea boat and rode the waves like a duck. The mate got caught by a sea though, which threw him in the lee scuppers and knocked him unconscious and put him out of commission for the rest of the voyage. I got caught a couple of times myself but my old horseshoe stayed with me and I suffered but a wetting which was uncomfortable enough because of the cold.

"O, yes, by the way, it was some cold. It was 13 degrees below at Norfolk which is the coldest ever recorded here.' There was about an inch of ice on deck and the lower rigging was coated with ice. We had about one week of gales and bad weather altogether and it sure was uncomfortable. Our skipper, who has been to sea nearly forty years, says it was the worst week he had ever spent at sea, and I am sure I can say the same. It was a great experience though but I didn't appreciate it at the time."

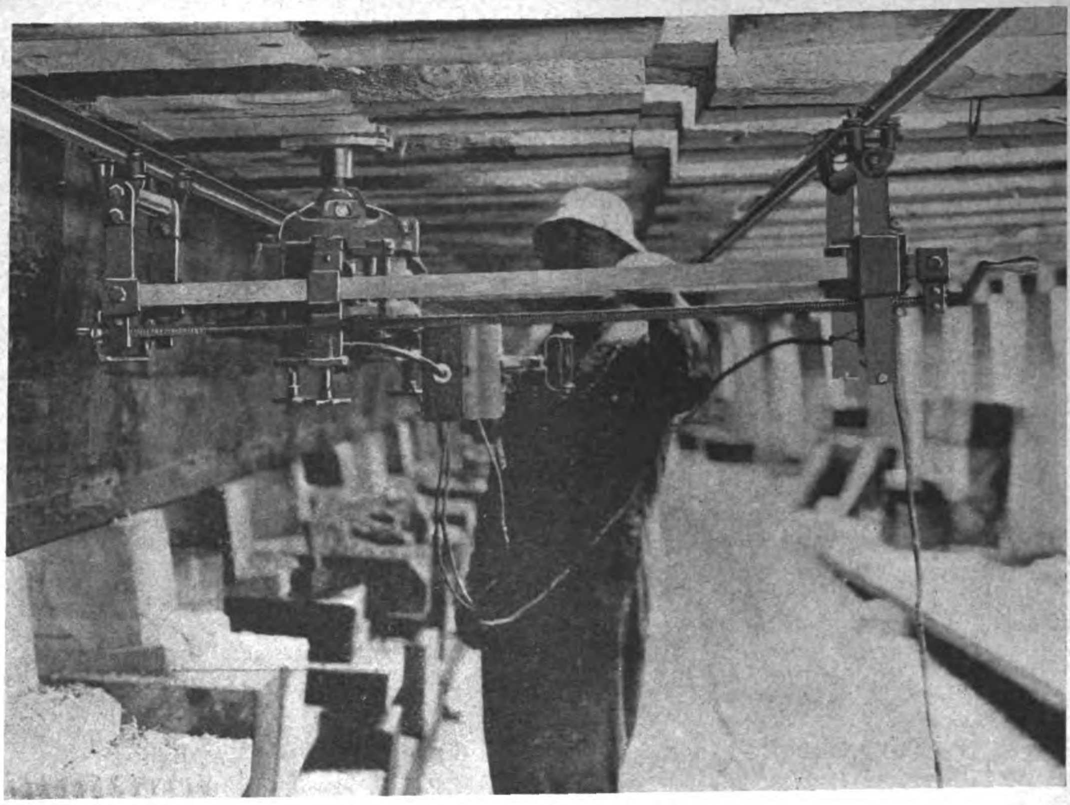
(Signed) GERARD GRAHAM.

DIESEL ENGINES IN JAPAN.

As previously indicated in "Motorship" a number of Japanese shipbuilders and engineers are building marine oil-engines. For about four years the Kawasaki Dockyard Co., Ltd., of Kobe, have had a Nurnburg-Diesel license, granted by the Maschinenfabrik Augsburg, Nurnberg (M. A. N.) of Germany.

FOR SALE
IMMEDIATE SHIPMENT
Van Blerck Marine Motor
150 H. P. 8 Cylinders 950 R. P. M.
William P. Brew
120 Broadway NEW YORK

A New and Ingenious Device for Builders of Wooden Ships---The Electric Dubber



THE ELECTRIC DUBBER IN OPERATION
Note the space dubbed and how smooth it is

THE accompanying photograph shows the Electric Dubbing Machine at work on one of the ships being built at the yards of the Foundation company at Tacoma, Wash., for the French Government. Several of these machines are now in operation in wooden shipbuilding yards throughout the United States where since their adoption they have gained immediate favor because of the work they do.

The Electric Dubber was designed and first built by an experienced wooden shipbuilder and is the result of many years of observation on his part. He believed that its introduction would speed up the construction on this type of ship and its performance has substantiated his belief. Gray and Barash, electrical engineers of 63 Horton street, Seattle, Wash., are now building this machine. On an ordinary type of auxiliary ship it will do 65 per cent of the dubbing—this work giving 100 per cent surface for the plank. On the Government type—the Ferris model— it will do 75 per cent of the dubbing. This work that it does, as has been mentioned, is perfect, giving a perfectly smooth surface for the planking of the ship, thus eliminating any chance for the splitting of the planks. Any two men can operate this machine and can dub 800 to 1000 square feet of surface in a day of 8 hours. It operates on two tracks laid the length of the ship as will be noted from the photograph. The cutter head revolves at a speed of between 1800 and 3600 revolutions per minute on a two or three phase motor, whose horsepower ranges from three to four and one-half according to the speed. The cutter head as used at the Foundation yards is 8½ inches wide. The size cutter head used in cutting the limber depends on the size of the timbers in use. The dubber has no difficulty in cutting from ¼" to ⅜" and will cut to a depth of ¾" in case of emergency by feeding the cutter head into the timber slowly.

The machine can be operated on the outside of the bottom frames—on the inside, on the outside and the inside of the ship's sides, and for the "dado." The machine is used by some builders to cut the limber—this operation is done when the machine is set up to dub the bottom, by changing cutter heads.

Mr. Heath, of the Tacoma Shipbuilding Company, states that after thoroughly trying this machine out that he finds it works entirely to his satisfaction. He also states that he finds it possible to do a very much truer and better job in every way than the job as done by the ordinary skilled hand dubber and this, at one-fourth the expense, to say nothing of the time saved. He states further that he cheerfully recommends the machine to any wooden shipbuilder in need of a first-class tool for the purpose.

Another shipbuilder states that 758 square feet on the bottom of a ship was dubbed by this machine in four hours, which he considers a "remarkable feat." W. E. Blaikie, the superintendent of the Meacham & Babcock Shipbuilding Company of Salmon Bay, Wash., is another enthusiastic supporter of the Electric Dubber for he states that "it is a great saver of labor and aids materially in the speeding up wooden hull construction with first-class work."

The following are a few of the companies who are owners of one machine or more: Tacoma Shipbuilding Company, the Meacham & Babcock Shipbuilding Company, Anderson Shipbuilding Company, Houghton, Wash., the Grays Harbor Motorship Corporation, the Government yards at Olympia, Wash., and the Elliott Bay Shipbuilding Company of Seattle, Wash. All of these companies are entirely satisfied with their purchases.

MR. F. L. SANFORD AND THE SENATE SHIPPING COMMITTEE.

Mr. Sanford. I visited the yard of Henry Piaggio, at Orange, Tex., in August. That yard has, I think, over 20 ships laid down now. It is a private yard, and they are building a ship running from 2,000 to 2,500 tons.

Senator Nelson. Are they building them for the Government?

Mr. Sanford. No, they are not building them for the Government; but every ship that goes into the water goes to Italy with war supplies, so that we are getting the same benefit of it as though it was for the Government. The timbers they use in those ships are materially smaller than are necessary for the larger ships.

* * *

The Chairman. Do you know anything about the operation of those ships to Italy, whether any of them have been used successfully?

Mr. Sanford. The "City of Orange" was the first one that made the ocean trip. They are auxiliary ships; they have, I believe, three masts, and the "City of Orange" has a 200-horsepower gasoline engine. They are putting now 200-horsepower engines in them. The "City of Orange" on her first trip across averaged, from Gulfport or Mobile to Genoa, a little over 8 knots an hour. Going down the Mediterranean she had a good breeze, and for one 24-hour period she averaged 16 knots. She beat the convoy from Gibraltar into Genoa by four hours.

The Chairman. She returned safely?

Mr. Sanford. She returned safely!

[Note.—The "City of Orange" is equipped with two 100 b. h. p. Fairbanks-Morse crude-oil engines. —Editor.]

Generated on 2024-09-13 08:57 GMT / https://hdl.handle.net/2027/nyp.33433107851499
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from NEW YORK PUBLIC LIBRARY

S. T. No. 62

AN oil-engined barge operating on the East Coast with regularity is the "S. T. No. 62" owned by the Standard Transportation Co., of New York, and we give an excellent illustration of this vessel. "S. T. No. 62" is 200 ft. long, by 35 ft. beam, with 15 ft. moulded depth, and carries 1,500 tons on a draught of 12 ft. She is propelled by a 320 b. h. p. two-cycle, direct reversible Bolinder oil-engine of the surface-ignition type.

For auxiliary purposes she has a 40 b. h. p. gasoline engine built by the National Meter Co. of New York, and this is used for driving the cargo pump and for operating the anchor windlass. There also is a 9 b. h. p. Standard (New Jersey) gasoline engine, connected to the electric lighting dynamo, and to an air-compressor.

GOVERNMENT ACTION URGENTLY NEEDED.

(Continued from page 4.)

ternal combustion-engine to a point where it could be installed in a large number of cargo-carrying vessels."

How contrasting seems to be the opinion of the great European shipbuilding countries! We all know how Norway, Sweden, Denmark, Holland, and Spain are building big ocean-going Diesel ships and motor auxiliaries; but they are neutral countries and their case is not so urgent as that of the Allies.

But look at our gallant ally Italy. Her greatest shipyards are producing **motorships.** For one yard alone the Italian Government are immediately withdrawing eight thousand skilled men from the army, twelve thousand men already being employed there, ard at that yard only Diesel motorships will be built. A new extension is now nearing completion and already in partial working order, and in addition to nearly twenty standardized motorships of 8,100 tons d. w. c. each that will be completed this year, this Italian concern can accept orders from the U. S. Government for duplicate motorships with deliveries commencing in less than four months from receipt of materials. They have the men, the equipment and the plant; but not all the materials. Surely this is even quicker construction than America can build **steamships.** Cannot we do the same as little Italy? Our resources are far greater.

A great Swiss engineering concern experienced in Diesel-engine construction, which recently has done splendid work for the British and French Navies, can supply this country with marine Diesel-engines to the extent of 4,000 b. h. p. this year and 23,000 b. h. p. in 1919. Also there does not seem to be a single European Diesen-engine company that is not willing to furnish American builders or the Government with all their drawings and the results of their experience, also expert help, so the extensive experimental work referred to by the Chairman hardly is necessary.

What did Japan recently do? She went to Europe and purchased the drawings and experience of a great Diesel engine concern and will build from them herself in order that she may have the very latest and highest-powered submarines and destroyers and in order to place a big motorship fleet upon the Pacific Ocean. For this she paid a very large amount of money.

In naval Diesel engineering we have sadly lagged behind, and since the war almost unbelievable developments have been made abroad with high-powered submarine and destroyer engines.

Obviously there is a pressing need for immediate construction of marine internal-combustion heavy-oil engines on a large scale in this country. While there is no real need to experiment, let experiments also be made on an extensive scale if the authorities think fit. We may bear in mind that the most successful weapons of war have been developed during the war. Did not the U. S. War Department consider it advisable to delay the entire machine-gun program while the new Browning gun was being experimented with and developed, in order to secure an ultimate maximum efficiency? The same procedure logically applies to mercantile and naval marine engine construction. Let us hesitate no longer!

MOTORSHIPS IN SPAIN.

About a year ago the Compania Trasmediterranea of Barcelona, Spain, according to their New York offices, purchased a number of Werkspoor Diesel engines for their ships. They expect shortly to place an order for an American-built Diesel engine of 250 b. h. p. if the order is not actually placed by the time this appears in print. Their New York address is 82 Beaver Street, with Mr. Manuel Romani as resident representative.

MOTORSHIP "NUUANU" RERIGGED.

The Philippine Co., of Manila, which recently bought the motorship "Nuuanu" from the General Petroleum Co., is having her converted into a four-masted schooner. She is equipped with a 320 h. p. Bol'nder engine and arrangements are being made to use a hollow jigger mast as smokestack for the exhaust.

ELECTRIC CARGO WINCHES

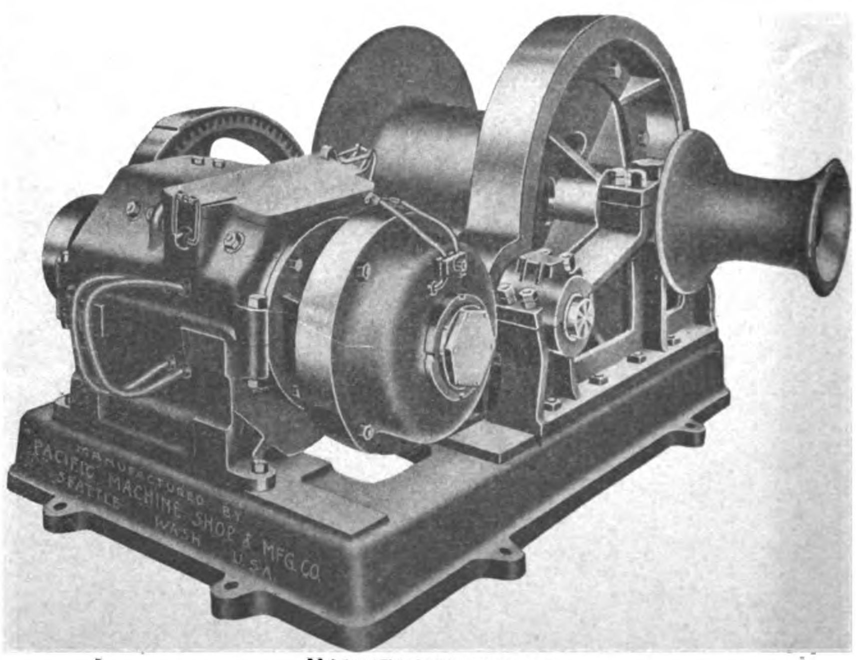
Direct Geared
Absolutely Waterproof

Perfect Control Hoisting, Lowering and Holding

Automatically protected against damage from overloading.

A single drum winch, controlled by one lever.

The fastest, simplest and most economical cargo handling equipment for Motorships, full powered and auxiliary, steamships and sailing vessels, loading lumber, coal or general cargo.



Hoisting speed varies with load.

Heavy loads can be handled slowly, light loads can be handled fast.

Any load can be lowered as fast or as slow as desired.

Any load can be held suspended for any length of time without danger of dropping.

If the current is cut off the load will NOT drop.

MANUFACTURED BY

Pacific Machine Shop & Manufacturing Co.

1432-34 Railroad Ave., Foot of Pike St.

SEATTLE, WASH., U. S. A.